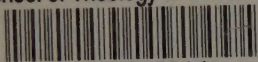


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ILLUSTRATIONS OF SCRIPTURE



“ Is it such a fast that I have chosen ? a day for a man to afflict his soul ?
to bow down his head as a bulrush ? ” Isaiah lviii. 5.

(PAPYRUS ANTIQUORUM—THE ANCIENT PAPYRUS.)

665
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ILLUSTRATIONS OF SCRIPTURE

FROM

BOTANICAL SCIENCE

BY

DAVID GORRIE

"The grass withereth, the flower fadeth, but the word of our God shall stand for ever."

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ILLUSTRATIONS OF SCRIPTURE FROM BOTANICAL SCIENCE.

INTRODUCTORY REMARKS.

IN these days, when the Natural Sciences are assuming a popular form, and when the delightful study of that branch of Natural History, which includes the characters, habits, and affinities of plants, has become an object of more general interest than it was at a time when botanists, then few in number, considered the classification and nomenclature of plants as the main object of their researches, it is interesting and instructive to inquire into the nature of those

moral and spiritual lessons which, on the authority of the inspired Word, are derivable from a contemplation of created objects, and in particular from an examination of those living but inanimate existences which, belonging to the vegetable kingdom, have been created for the purpose of adorning the face of earth, and for affording the means of animal subsistence. These objects display at once the bountiful beneficence of their Creator, and the extent of His power and wisdom, unlimited as it is by the farthest researches which the magnifying power of the microscope enables the Naturalist to make into the structure and economy of Organic Nature. The study of Botany is no less attractive and engrossing than it is, when conducted in that subdued and humble spirit so befitting in intelligent creatures of finite comprehensions, adapted for enlarging their ideas of Divine greatness and beneficence, and enforcing those lessons of truth which it is so much their interest to learn.

The Garden of Eden, that abode of primeval innocence, was not intended to be, like the fabulous gardens of Hesperides, of Adonis, and of Flora, a scene alone of pleasure and delight. It was, doubtless, to our first parents before their fall, a school of religious instruction, in which sublime spiritual truths were taught and illustrated by reference to things outward and sensible. Teaching by analogy is suited to the nature of the human mind ; and throughout the whole of Scripture history, from the time when coats of skin were made by the hands of Jehovah himself for the clothing of Adam and Eve, downwards to the period yet future, when there shall be “no more sea,”—from the fencing of the tree of knowledge of good and evil, to the planting, flourishing, and fruiting of the tree of life in the midst of the New Jerusalem,—emblematical instruction characterises the writings and sayings of the inspired Prophets and wise men, who spake as they were moved by the Holy Ghost. The

Great Teacher himself, who used miracles for conviction, employed emblems for instruction ; and the most of these were drawn from the natural habits of plants, or from the arts of culture, to which they had been subjected.

The simplicity, appropriateness, and beauty of the natural emblems employed in the Bible, are such as cannot be paralleled by uninspired authors. It will be found regarding them, that, after the strictest examination, no discrepancy between them and the truths they are intended to illustrate, is discoverable. In using them, however, in the further expounding of Divine truth, by those who, though commissioned to preach the Gospel, have not imparted to them the gift of infallibility, it is essential that they be understood in the light of those sciences which are open to human research, since, without such light, their meaning may be lost or obscured. If it is necessary, on the part of Gospel teachers, to study the original languages

employed by the inspired writers, in order that they may be qualified for searching into the meaning of Scripture words and sentences, it must also be of importance, that, by an acquaintance with Natural Science, and with the arts of rural life, they should be able to explain those emblematical representations of truth which are expressed by figures derived from the qualities and habits of plants and other natural objects, and by references made to the arts of vegetable culture. Hence it must be commendable to combine garden and rural studies with that attendance in classes for Natural and Moral Philosophy which is required of students for the ministry. Hence the relative importance of the knowledge to be gained in the "Students' Walk," be it a walk through woodlands, fields, or gardens; and hence one of the main uses of the "Manse Garden" as a scene of relief from severer studies, and yet a school in which instruction may be gained, of a kind fitted to tell

on the character of the weekly ministrations with far greater effect than any amount of mere scholastic learning.

The moral lessons derivable from the study of plants are of a varied character, and occupy a high place amongst the teachings of Natural Theology. Agreeably to the modern scientific system of reducing first principles and primary elements to the smallest number, and, if possible, to unity, it has been attempted by botanists to prove that a perfect plant consists but of two parts—the leaf and its axis—and that a flower is but a cluster of leaves in a different stage of development. This doctrine, like many others, may be so explained as to lead to the conclusion that flowers and fruit are abortions, or monstrous productions—that the development theory of some geologists receives countenance in the history of every plant—and that the ancient belief in the transmutation of plants from one species to another, is to be treated with respect instead

of ridicule. Or, on the other hand, this doctrine, which is styled Vegetable Morphology, may be placed in its proper and legitimate sphere, by being used as a mode of illustrating that wonderful prevalence of order and uniformity amidst boundless variety, which is observable in all the works of creation. Diverging to one side, the student of vegetable structure is led into mazes of error ; to another, wide regions of glorious truth open up before him. From Botany, as from Geology, Christianity and Revelation receive confirmation and support, when it is studied in a humble and truth-seeking spirit. When the reverse is the case, the doctrines of the Bible stand unharmed though assailed ; and the scientific learner, according to the language of the Apostle, becomes a fool while professing to be wise. Chance development is a theory unsupported by plants. The impress of its Creator's hand is borne by the lowliest wild-flower, in its colour, uses, and the geometrical

relation of its parts. The cultivated favourite of the florist may be said to bear such an impress even more than the wild-flower, since the approach to the circular or semi-globular shape, so essential in the progress of a florist's flower towards perfection, exhibits fresh proofs of the wide prevalence of uniformity and harmony amidst the endlessly beautiful and varied productions of the vegetable creation.

In the Bible, herbs, flowers, and trees are frequently mentioned as objects fitted to show forth the power, wisdom, and goodness of their Creator ; but some of them are also used as types and emblems of things sacred and heavenly. Thus those saints above who inherit the blessedness of those that overcome, are represented as bearing palm leaves in their hands in token of victory ; and thus, under a bygone dispensation, the bunch of hyssop used in the ceremonies attendant on the removal of leprosy, imparted the idea of cleansing, while the accompanying scarlet

wool shadowed forth, by its colour, the blood that takes away sin. This class of lessons, derivable from the plant creation, belongs to a dispensation of promised grace in a world of sin ; and exists apart, on the one hand, from the instruction which plants are fitted to give in Natural Theology ; and, on the other, from that “ language of flowers ” which is common to all nations, and which is included in the phytology of inspiration.

This language of flowers owes its existence to that faculty of perception, whereby human beings associate thoughts and sentiments with physical objects ; and, in thus exercising their intellect, call in both memory and anticipation to aid in completing the picture. Without the exercise of the imagination, a picture, a landscape, a flower, or any beautiful object whatever, becomes unmeaning and unimpressive ; and the Fine Arts are beholden to the principle of association for a great proportion of that power of affording satisfaction and pleasure which they possess. By the inspired poets all objects in creation are

endowed with language. “The heavens declare the glory of God, and the firmament sheweth His handy-work. Day unto day uttereth speech, and night unto night sheweth knowledge. There is no speech nor language where their voice is not heard.” But to plants, definite ideas are attached, and they are made to speak in precise though silent words. Fragrant herbs and beautiful flowers tell of the rich graces and attractions of Immanuel, and of his redeemed. The Lily growing among thorns is a fit representation of the Church in her state of warfare on earth. The Saviour himself, in the days of his flesh, was as a root out of a dry ground, having, to human eyes, no form nor comeliness. The uncertainty of life, and the certainty of a speedy return of that dust which forms man’s corporeal frame to its kindred dust, and the consequent perishing of all human glory and excellence, are forcibly expressed in the sublimely descriptive words, “all flesh is grass.”

The following Treatise aims at bringing to-

gether some of those illustrations of Scripture emblems which Botanical Science is fitted to afford, and thus forming a small contribution towards the elucidation of a subject which has already occupied the attention of many writers and commentators, but which, being in a manner inexhaustible, still affords room for fresh remark. In more than one instance, observations may be made at variance with the recorded opinions of Bible commentators; and this more especially in the part that treats of the allegory used by Paul regarding the grafting of the wild into the good olive. That differences of opinion should exist on what may be called the details of the botanical allegories used in Scripture, is a proof in aid of the statement already made, regarding the importance of a knowledge of plants to those who would rightly and thoroughly expound the writings of inspiration.

It is assumed that the emblems of Scripture are truthful. In making incidental references

to Physical Science, the inspired writers sometimes employed such language as was current in their time, though this language was consistent with obvious appearances rather than with scientific facts. Hence the astronomer and the geologist may find in the sacred volume statements that they would feel constrained to express in different words. But in such sentences as “the sun riseth and the sun goeth down, and hasteth to the place where he arose,” the inspired authors expressed certain ideas by allusions to visible things of easy comprehension; and as the teaching of Physical Science was not their object, they had good reasons for using the current expressions of their times, instead of that strictly correct language which a philosopher might have preferred. But in the emblems of Scripture there is a fitness and an aptitude in the language employed regarding physical things, as well as in the ideas intended to be conveyed. Forgetful of this befitting feature, some commentators,

aware of the real nature of the grafting process, have attempted to shield the Apostle Paul from misconception in his beautiful allegory of the wild and good olive, by inferring that loose and erroneous ideas on the subject of grafting prevailed in his day, as well as amongst theologians, and even amongst botanists and philosophers in modern times; and that the Apostle adapted his language to prevailing opinions. In attempting an explanation of this allegory on phytological grounds, such a supposition is, in this volume, disowned; while, on the other hand, the pages of classical authors have not been consulted for the purpose of showing that it was really the custom, in olden times, to graft the wild on the good olive, for the purpose of improving the *natural* qualities of the graft.*

* A passage in the writings of Pliny countenances the idea, and has been quoted for this end more than once. But the same author speaks of a tree grafted to bear, *on the same stem*, pears, apples, figs, plums, olives, almonds, and grapes;

The subject of the geographical distribution of plants is engaging much of the attention of modern botanists ; and theories have been propounded, regarding the common origin of species from one centre, which may never be satisfactorily proved. The Bible gives no distinct statement on this subject, though its language seems to indicate that a sudden and simultaneous creation of plants, over the surface of the dry land, and at the commencement of the present geological era, took place. It seems to have been the belief in Jewish times, that plants were created suddenly, and that as Adam was created in full stature, and able to turn his “wondering eyes,” in the language of Milton, “straight towards heaven,” so trees, in the first day of their

a feat in cultivation that never was or will be accomplished. There may, however, have been a deception practised, as is done by the Italian gardeners of the present day, who bore out the heart of a living orange stem, and introduce jasmines and other flexible plants through it, so that all appear to be growing from the same root.

existence, were adorned with leaves and flowers, and laden with fruit. In the second book of Esdras, which, as being one of the apocryphal books, is to be consulted only as a historical authority, the following passage occurs, and it doubtless conveys the common belief entertained at the time of the writer:—"As soon as Thy word went forth, the work was made. For immediately there was great and innumerable fruit, and many and divers pleasures for the taste, and flowers of unchangeable colour, and odours of wonderful smell: and this was done the third day."

ILLUSTRATIONS OF SCRIPTURE FROM BOTANICAL SCIENCE.

CHAPTER I.

THE PARTS AND NATURAL PROCESSES OF PLANTS.

PLANTS, with all their varieties of forms and qualities, possess but few elementary organs; and while a detail of their compound organs shows a wondrous dissimilarity, this is combined with an equally wondrous uniformity, and their primary or elementary tissues are few in number and simple in their construction. The elementary

organs of plants consist of cellular tissue, woody fibre, spiral vessels, ducts, the cuticle, and the stomata. The compound organs consist of the axis, which has been compared to the vertebral column in animals ; and of those various appendages to the axis which complete the vegetable structure. The root is called the descending, and the stem the ascending axis ; and the appendages consist chiefly of leaves and buds, these buds being capable of development into leaves, flowers and fruit. By the use of terms, which to the learner may appear lacking in simplicity, the parts of plants may be described in few words ; and being thus described, the plants themselves become fitted far more than they would otherwise have been, for being used as illustrations of the power and goodness of their great Creator.

Cellular tissue, a collection of minute and transparent vesicles or cells, varying in shape, fills up the spaces between the veins of leaves, and composes almost the whole structural sub-

stance of fruit, of fleshy or tuberous roots, and of the inferior orders of plants, including mushrooms, lichens, and mosses. These lower plants are termed, in botanical phrase, *acrogens*, from the mode of their growth, which, in simple language, is effected by the elongation of their parts; and it is supposed that they constitute the first group of plants mentioned by Moses, in the words “tender or sprouting grass,”—“the earth brought forth grass.” In the leaves of some of the higher plants, the cells are so small that it takes one thousand of them, placed end to end, to form a row one inch in length; but in others they are much larger. The higher plants have lengthened vessels, together with cells, and their tissue is therefore termed *vascular*. The woody fibre of trees and shrubs consists of elongated tubes, and these are found to some extent in herbs, though chiefly in ligneous plants. Spiral vessels are formed of elastic tissue twisted spirally within a membrane, and are found in

various parts of trees and herbs,—“the herb seeding seed, and the fruit-tree yielding fruit,”—but rarely in plants of the lowest class. The membranous tube within which the elastic fibres are twisted, receives strength by their means, which it could not otherwise possess. These tubes, with their elastic spiral fibres, vary in diameter from one-threehundredth to one-three-thousandth part of an inch. The ducts are transparent tubes marked with lines or dots. The cuticle is a thin skin covering the leaf; and the stomata are pores scattered over it. These are considered as organs of exhalation, which are also capable of imbibing such aqueous vapours as may be found floating in the atmosphere. They appear mostly on the under surface of leaves, and vary in number from two hundred to a hundred and sixty thousand within the bounds of a square inch. By means of these and the other microscopic parts of plants, which are described at length in the writings of botanists, there may

be derived ever fresh and ever unexhausted proofs of the greatness and depth of Creative power and wisdom. But while plants combine with all other natural objects in showing forth the praises of their Creator, they have, in a peculiar manner, been selected as emblems of those Gospel truths which have been taught by direct revelation from heaven, and which alone can make wise unto salvation.

The stems of the highest order of plants increase in thickness by outside layers of woody fibre and tissue, or layers annually deposited immediately within the inner membrane of the bark. These plants are therefore termed *exogens*, or outside growers ; and their type is the "fruit-tree yielding fruit" of Moses. The stems of the middle division of plants increase in size by the pressure of parts outwards from the centre, and these plants are therefore termed *endogens*, or inside growers. While the stately palm ranks among them, they also include the grain-pro-

ducing grasses or corn, and are therefore appropriately typified by the herb seeding or “yielding seed.” The mode of growth peculiar to the lower plants, implying an elongation or dilatation of parts, is somewhat analogous to that which belongs to some sentient creatures placed near the lowest verge of the animal kingdom. The three classes of plants described by the inspired historian of creation, corresponded with the three classes of the natural system of botany as at first established ; but these classes have been increased by botanists of late years to seven.

In the various references made in Scripture to the parts of plants, the higher orders of vegetation are chiefly attended to ; and in the following remarks on Scripture phytology, the parts and structure of plants will be noticed in terms having a similar bearing.

As a definition of what is termed the root of a plant, it is considered as that part of a plant which strikes downwards or inwards into the

soil, or other sources of the saline principles of vegetable nutrition. The first roots proceeding from germinating seeds, have a tendency downwards, in whatever position the seed may have been placed. Nutriment is imbibed, in a soluble state, by the parts which form the termination of the rootlets or small root fibres; and these, from their structure, and their capability of absorbing moisture from the soil, are called by botanists *spongioles*, or little sponges. Fibres, with these absorbing and cellular extremities, are generally fewest in number on plants growing in a rich and moist soil; and in such a soil a comparatively small number proves sufficient for supplying the wants of the plant, there being ready access for the rootlets to a sufficiency of food at all seasons. The fibres become numerous according to the dryness or lightness of the soil, because in porous soils the fluids sink rapidly beyond their reach, and it requires a great array of rootlets to furnish the plant with nourishment

in times of drought. There is a similar adaptation in the roots of many plants to the depth of their range in the soil; the roots of the ash-tree and the beech, which remain near the surface, having numerous food-appropriating fibres, while those of the oak, which strike deeply into the soil, beyond the influence of ordinary drought, have comparatively few. Some herbs, when they find themselves in drier soil than they are naturally adapted for, have the power of changing their root-stems into thick cellular receptacles, something akin to tubers or to bulbs; and in these a store of nourishment is laid up in times of rain, to serve in seasons of drought. The time of adversity is provided against; and though the "tender plant" should have its roots fixed in "a dry ground," it shall still "grow up before Him" who hath placed it there, if such be His will.

The root fixes the plant in the soil, and trees strike their roots deeper and wider in exposed

or stormy places, than in sheltered situations. Virgil believed, or professes to have believed in the notion, that the roots of the oak penetrate as deeply into the ground as its branches ascend "high towards heaven;" and although this deep penetration of the roots is but a poetic fiction, the Mantuan bard was justified in observing, that a tree with such roots as the oak, might well defy winds and winter's rage. Without applying to it the untenable belief of an equality in depth and height between the roots and branches, it has been simply but truthfully said of the wild or Highland pine of Scotland, that "firmer he roots him the ruder it blow." It is well known by arboriculturists that motion, as produced by wind, favours the formation of woody fibre, aiding as it does the descent of the elaborated sap from the leaves to the stem and roots; and that plantations that have long remained in a closely crowded state, cannot be thinned without danger to the trees that are left

standing, the heads of these being liable, in times of high wind, to overbalance, and so tear up the slender root-limbs. To both safety and nourishment, as derived from the roots of plants, spiritualised allusion is made by Isaiah, in these words of promise,—“The remnant that is escaped of the house of Judah shall again take root downward, and bear fruit upward;” and in another place,—“He shall cause them that come of Jacob to take root.” “Those that be planted in the house of the Lord,” says the Psalmist, “shall flourish in the courts of our God.” And in the prophecies of Hosea it is said, by Him who is the fountain of grace and source of strength, “I will be as the dew unto Israel; he shall grow as the lily, and cast forth his roots as Lebanon.” The uprooting or destruction of the wicked forms a counterpart to this pleasing similitude.

Trees of the pine and fir tribes, when cut over, do not send up fresh stems, like broad-leaved trees in general; but their roots immedi-

ately begin to decay. It was a broad-leaved tree, therefore, and not a pine, that the patriarch of Uz had in view when he said, "there is hope of a tree, if it be cut down, that it will sprout again, and that the tender branches thereof will not cease." The magnificent cedar of Lebanon might have been looked upon by Nebuchadnezzar as a suitable emblem of his own glory and power, but it cannot have been this tree that he saw in his dream—a tree that grew "and was strong, and the height thereof reached unto heaven, and the sight thereof to the end of all the earth." Had it been a resinous tree, a cedar, pine, or fir, it would have been in vain to have left the "stump of his roots in the earth," until "seven times would pass over him," expecting that vitality would again show itself. It must therefore have been a broad-leaved tree, having the power, which trees of the fir tribe do not possess, of forming fresh buds and putting forth fresh branches at any part of the stem, and at

any time when the flow of sap has been accidentally stopped. This idea is confirmed by the statement that it was a fruit-producing tree, affording "meat for all." Bearing fruit, and growing afresh when cut down, are properties that apply conjunctly to some trees; and there are other trees to which neither of them can properly apply. The passage exhibits an undesigned confirmation of a botanical truth on the part of Holy Writ.

The *bulb* is intermediate in character between the root and the seed. Its scales form a case to protect the embryo plant in winter; and it contains a store of nourishment which, as in the case of the cultivated hyacinth, may enable the plant to grow and blossom, though the roots descend only into pure water. The nature of the bulb, the mode of development of a bulbous plant, and the whole progress of the plant, from its state of hybernation, within the compass of the bulb to its stage of flowering and seeding, are



" Consider the lilies of the field, how they grow ; they toil not, neither do they spin : and yet I say unto you that even Solomon, in all his glory, was not arrayed like one of these." Matt. vi. 28.

LILIUM CHALCEDONICUM,
THE SCARLET MARTAGON LILY, (WITH SECTION OF BULB.)

all alluded to in the Divine injunction—"Why take ye thought for raiment? Consider the lilies of the field, *how they grow.*" The disciples were not counselled merely to mark and admire the beauties of the lily in the full glory of its summer display, but to consider the wondrous development of so much beauty from a scaly bulb, having no beauty in itself, and without any power of growth, save what it had derived from its Creator. The earthly glories wherewith Solomon was surrounded, being derived from external and not from natural sources, were not to be compared to the native graces of the lily.

Some plants, called in botanical language inferior and imperfect, are without roots; and some grow in earth formed entirely of mineral substances, or on the surface of stones and rocks. The presence of organic matter is essential to the growth of the higher orders of plants; and the lichens and mosses, that occupy a humble

position on the surface of rocks, aid in the formation of soil, contributing to it in some instances the first particles of organic matter which it contains. Solomon spake of trees, "from the cedar tree that is in Lebanon to the hyssop (or moss) that springeth out of the wall;" placing this moss at the lower end of the scale, yet acknowledging its position and importance in the vegetable economy. Faint, despairing, and weary, the African traveller was led to experience that in a moral, as well as in a physical point of view, the lowly moss was not created in vain; and the lesson that it taught him incited to renewed faith and hope.

The sap of a tree, after having been absorbed from the soil by the spongioles of the root fibres, is conveyed upwards to the leaves to be elaborated, and rendered fit for adding to the solid texture of the branches, stem, and root-limbs. The chief channel of the sap's ascent is the *alburnum* or last formed woody layers; and sap

ascends partially through all the outermost layers of woody fibre, called "white wood" by carpenters; but not by the interior part of the stem in old trees, which is termed "red wood," and has attained its last degree of solidity. Sap is in motion, more or less, at all seasons, except when actually frozen in severe northern winters; but it will not flow in winter from an incision made through the bark, and flows from such an incision more freely in spring than in summer. In those countries where there is no real winter, the motion of the sap is more uniform throughout the year; and from an incision made in the stem of the palm, it will flow at any season. That tropical tree puts forth its fresh leaves before the foliage of the former season falls off, and is thus evergreen;—"The righteous shall flourish like the palm tree." The causes of the sap's ascent are obscure, and this obscurity has led to the formation of divers opinions on the subject. Magnetic tendency, volatile nature, capillary

attraction, contraction, and dilatation of air in the vessels, heat, irritability in the sap-vessels, the agency of the two electricities, and atmospherical pressure, have been named as causes, with varying degrees of plausibility. That a natural cause exists, may be determined by analogy ; but here, as elsewhere, in the developments and phases of life, there will continue to be mysteries. To the Great First Cause, all other causes occupy a secondary place. Creating and preserving power is manifested in the vitality of plants, and the same power is exercised in communicating and sustaining the energies of spiritual life. “ They shall bring forth fruit in old age ; they shall be fat and flourishing.”

To many of the parts of plants, such as the medullary rays, which connect together the different layers of wood, or as the pith, the bark, and the leaf-buds, direct reference is not made in Scripture, though their presence is implied in allusions that are made to the economy of vege-



"They clothed Him with purple, and platted a crown of thorns, and put it about His head, and began to salute Him, Hail, King of the Jews!"

Mark xv. 17.

(ZIZYPHUS SPINA CHRISTI, and Z. PALIURUS—"CHRIST'S-THORN," 2 species.)

tation. In botanical phrase, leaf-buds are sometimes imperfectly developed, so as to form a spine or thorn instead of a branch, as in the common hawthorn and the wild apple. Cultivation, by aiding the right development of the parts, causes the disappearance of spines from many trees; and the cultivator is thus in some measure enabled to counteract that tendency to "bring forth thorns," which has been natural to the earth since the time when Adam went forth from Eden. The curse that was pronounced on the earth because of sin, rendered culture necessary; and the prospective removal of that curse—a removal in part immediate—made it capable of being prosecuted successfully. Some plants, such as the rose, put forth prickles from their stems, the uses of which are imperfectly understood. Like the points of the leaves, they may attract the electrical fluid, which is an essential element in the vegetable economy. Leaves are developed as the stem or twig advances in

growth, and are arranged with greater or less regularity, affording an example of that combination of variety with uniformity which characterises all the Creator's works. Hairs are found occasionally on all parts of plants, including the roots of some species, and are of use in the secretion of moisture, and for the control of evaporation. In the Bible, no immediate reference is made to the flower-buds, or to those various parts of a flower, which are termed by botanists the calyx, corolla, styles and stamens, receptacles and seed-vessels. The "flower of the grass" may, however, be a phrase applied to the stamens that hang loosely from the grassy inflorescence, the other parts of the flower being less conspicuous, and partially hid by the glumes or chaff. It is probable that the Hebrews, in the time of Moses, were familiar with the economy of the flower—with the uses of the central style or styles for receiving on the summit or stigma the fructifying farina or pollen, matured in the

anthers of surrounding stamens, and conveying its fertilising principle to the germen, or rudiments of the fruit or seed. The farina of some flowers is scattered by the winds, and only a part lights on the summit of the style; but the profusion in which it is produced obviates any loss that might hereby be sustained. In some flowers the anther bursts immediately over the stigma, when the farina is matured; in others, insects, and especially bees, convey unwittingly the farina from the anthers to the style; and in some species, the flowers that contain the anthers exist on separate plants from those which produce seed. Spread by the wind or by insects, the farina of a flower may alight on the styles of a different plant; and if this plant is nearly allied to that which produced the farina, hybridisation may be the result, and the purity of a valuable species or variety may thus be injured. It would seem that Moses referred to this process of accidental hybridisation when he said, "Thou shalt

not sow thy vineyard with divers seeds, lest the fruit of thy seed which thou hast sown and the fruit of thy vineyard be defiled." Of fruit there is frequent mention made by the inspired writers. The word fruit, in a botanical sense, admits of very wide application; but in popular language, it means the succulent, pulpy, fleshy, or hardened substance of the berry, the pome, the drupe, or the nut—a substance that has evidently been called into existence for some other end than the mere protection or nourishment of the seed which it encloses, or of which it forms a part. "Of every tree in the garden thou mayest freely eat; but of the tree of the knowledge of good and evil, thou shalt not eat of it." The date, the raisin, the fig, and the pomegranate, are frequently mentioned in Scripture; and some of them are now, as they were formerly, of considerable importance as articles of food in Syria and the adjacent countries.

Numerous references are made by the inspired

writers to the seed of plants, and to the process of germination, as illustrative of the progress of great and important events from beginnings that are small and obscure. Seed is small in size, and the bulk of seed sown in a field is small as compared with the produce. "There shall be a handful of corn in the earth, upon the top of the mountains; the fruit thereof shall shake like Lebanon." "The kingdom of heaven is like to a grain of mustard seed, which a man took and sowed in his field." "For who," says Zechariah, "hath despised the day of small things?" From the small seed sown in the field arises the greatest of herbs, so great as to assume the habit of a tree, and afford shelter to birds amongst its branches. The stone cut out without hands shall become a great mountain. Grace is added unto grace. But the same allegory serves to illustrate the progress of depravity in the human heart. "A little leaven leaveneth the whole lump;"

and the seeds of tares, sown by the enemy, are as small as those of wheat.

The seed contains the germ of the future plant; and the plant that springs from it, if uninfluenced by culture, is the botanical counterpart of that which produced it. By culture, varieties of plants may be produced, but native characteristics cannot be removed or altered. This botanical truth is used by Paul to illustrate an important Christian doctrine,—“ Whatsoever a man soweth, that shall he also reap; for he that soweth to the flesh shall of the flesh reap corruption, but he that soweth to the Spirit shall of the Spirit reap life everlasting.” Every plant produces its own kind of fruit, and its own kind of seed. This statement is none the less true, although artificial or accidental hybridisation may lead to the growth of new varieties of plants, to which circumstance allusion will afterwards be made. Before opening his argument

regarding the duties and glorious privileges of the Gentiles when admitted into the church of God, under the allegory of grafting a wild into a good olive, Paul first establishes a moral doctrine, by using a phytological truth in illustration thereof, to the effect that causes and their results are of like character. A necessary connection in nature and kind exists between the branches and root of a tree, they being members of the same individual plant, and the one deriving sap from the other. "If the first fruit be holy, the lump [or mass] is also holy; and if the root be holy, so are the branches." In reference to the general truth that every plant has its own fruit or seed, the Apostle James asks, "can the fig-tree, my brethren, bear olive berries? either a vine figs?" So, in the Saviour's own words, "Ye shall know them [the false prophets] by their fruits. Do men gather grapes of thorns, or figs of thistles?" The ancient doctrine of vegetable transmutations, which taught that rye might by

culture be changed into wheat, or a certain wild moorland grass into oats, fell into disrepute before the advance of botanical science; but it has of late years been revived by certain learned phytologists, evidently for the purpose of supporting their favourite doctrine of vegetable morphology, which, when carried to its extreme limits, supposes a process of vegetable development similar to that which certain other men of science have advocated as explanatory of the phases of animal life. If the doctrine of vegetable transmutations were true, the whole fabric of botanical science, founded as it is on the separation of plants into distinct alliances, orders, genera, and species, would rest on a very unsatisfactory foundation.

Seed of some kinds, and under certain circumstances, will retain its vitality for many years. It has been asserted that *mummy wheat*, or wheat that ripened on the banks of the Nile three thousand years ago, has vegetated of late

years in England. The assertion has not been fairly authenticated; and it is questionable whether sufficient grounds of evidence exist for proving its truth; but it is nevertheless a fact, that while some seeds lose their vitality soon after they reach maturity, other kinds will retain it for at least hundreds of years, if buried deeply in the soil. As one proof of this, it has been found in various instances that earth excavated from the site of ancient monasteries and thrown up in mounds, becomes covered with henbane and other plants, the produce of seeds that had been ripened in the herb-gardens of the monks at some period prior to the Reformation. The seeds of field plants in common culture may require from two days to a month to germinate, the time varying according to the temperature of the soil; and in the climate even of countries so warm as Syria, several months must elapse between seed-time and harvest; so that "one may sow and another may reap."

Maturity in grace, or even the first budding thereof, is sometimes delayed till long after the sowing of the seed. The seed that produced thirty, sixty, and an hundred fold, germinated more slowly than that which “sprang up because it had no deepness of earth, and when the sun was up, withered away.” But, on the other hand, the fruits of evil sowing may be reaped far on in time, and, it may be, in eternity.

By botanists, all seeds that bear the remains of the floral style on their summit are called fruits, the grain of wheat being thus a fruit as well as the apple. In biblical, as in popular language, the term fruit is applied to the fleshy and mostly edible receptacles of seed that grow on trees and shrubs, while grains are classed with seeds. “And God said, Behold I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat.”

In regard to the fruit of the fig-tree, of which frequent mention is made in Scripture, it may be stated, that what appears to be a young fig, is in reality a fleshy receptacle, enclosing the flowers, which cover its inner surface. The fig-tree, like other trees, has its blossoms, but they are hidden within this receptacle, which, at its apex, is nearly but not altogether closed. The Hebrew word applied to the flower of the vine in the Song of Solomon, [vi. 11,] is that translated by "blossom" in Habakkuk,—“Although the fig-tree shall not blossom.” It means budding, sprouting, germinating, or flourishing. The word “bud” may apply to both the vine and the fig. The fruitful branch of the vine is distinguished as soon as the flower-buds appear; and the coming forth of the young figs, or fleshy receptacles of the flowers, resembles budding rather than flowering. But if the word *bud* be applied to the vine in Song vi. 11, it becomes necessary to seek another word for *budded* in

the same verse, in the case of the pomegranate. The Hebrew word here may be translated *blossomed*, or *burst forth*.

The fig-tree is said to put forth “her green figs” when the winter is past, and the rains “over and gone.” The word for “putteth forth” in Hebrew, is understood by some to be properly “to spice;” and they render the passage, “the fig-tree fills its fruit with aromatic juice.” But the Hebrew noun for figs here used is the name of the *first young figs*, which are perishable, and more liable to drop off than the latter figs. Parkhurst translates the passage—“The fig-tree *embalmeth* its early figs;” filling them with that “clammy delicious juice” which may prevent them from corrupting and falling off, and which is alluded to in the parable of Jotham:—“The fig-tree said unto them, Should I forsake my sweetness, and my good fruit, and go to be promoted over the trees?”

CHAPTER II.

THE ELEMENTS AND AGENTS ESSENTIAL TO VEGETATION.

It is distinctly stated by Moses, that, on the third day of creation, the earth, in obedience to the Divine command, brought forth plants of the various orders and tribes, from the lowly moss upwards to the stately tree. The herb, or corn, bearing seed, was said to be upon the face of all the earth, and, along with the fruit-tree, was given as a food-producing plant. The lower orders of plants, including the mosses and fungi, and termed grass in the English Bible, are not mentioned in the food-producing classes of plants; but all are said to have been brought forth by the earth. The term is none the less appropriate,

though it is found that earth or soil constitutes but one of the agents essential to the development of vegetable life.

Deprived of light and air, plants will perish. At the time when the earth was "without form and void," the balance of the air may have been adjusted by some natural agencies, such as the phenomena of electricity, so that its gases might be duly proportioned to the requirements of plants and of animals. The refreshed appearance of nature after a thunder-storm in summer, is caused only in part by the supply of moisture which the showers have conveyed to the roots of plants. The nitrogenous gases that are brought downwards from the thunder-cloud have their influence in causing the foliage of summer to wear a still deeper green. The glorious display of verdure that covered the earth on the third day may have owed the freshness of its beauty in part to the previous troubling of the unenlightened atmosphere. There was a wise adap-

tation in the order of events, which precluded the creation of plants till the proportions of the aërial gases were adjusted to the wants of their foliage, and till there was light—called into existence by Him who “covereth himself with light as with a garment”—to sustain their vitality, and this, in so far as they were concerned, “before the shining roads of heaven were measured by the sun.”

Air consists of a mixture of oxygen and nitrogen gases, with carbonic acid in a proportionably very small quantity, and a variable proportion of watery vapour. The carbonic acid exists in the proportion of 1 in 2500, and it is supposed that the proportion is rather less now than at an early period of the world's history, since part of the carbon now existing in coal-beds and peat-mosses, once floated in the atmosphere in a gaseous state. The oxygen of the atmosphere is necessary to the life of plants as well as to the breathing of animals, and the carbonic acid

affords to plants an important part of their food, to the appropriation of which light is essential. Plants form the food of animals, and animals restore by their breath the carbonic acid which plants had abstracted from the air, so that the balance of the atmosphere is maintained. The leaves of plants are spread out for the purpose of inhaling gaseous food, while the roots are diffused in the soil for the purpose of inhaling food in a liquid state. The solid wood of a forest is, in the slow course of time, abstracted from the moving air, through the agency of millions of pores on the surface of thousands of square feet of foliage wherewith every tree is furnished. Of these pores 120,000 have been counted on one square inch of leaf surface in some species, and more in others ; so that though the proportion of carbonic acid in the air is so small, the means for its appropriation are provided in wondrous profusion.

Light, in its action on the leaves of plants, aids them in absorbing carbonic acid from the atmos-

phere. This it does either by direct agency, or by acting on the leaves in a stimulating manner. Trees exposed to light and air on every side form more timber, and that timber is solidified by a greater proportion of carbon, than is the case with trees growing densely together, having few leaves, and these in part overshadowed. The sunbeam is the main agent in giving to plants their solidity as well as their colour. Plants in a window garden bend towards the light, seemingly from instinct, but actually from a simple natural cause, namely, the elongation and softening of the fibres in the shaded side of the stem, and the solidifying and contracting of those on the side acted on by light. The bending of a sheet of paper held near a fire is produced by a similar mechanical cause, the agent being heat instead of light. The influence of the sunbeam on vegetation is mentioned in the same Scripture sentences with that of rain or moisture,—“ He maketh His sun to rise on the evil and the good, and sendeth rain on the just

and on the unjust.”—“ He shall be as the light of the morning when the sun riseth, even a morning without clouds ; as the tender grass springing out of the earth by clear shining after rain.” It is during the healthy performance of their functions that the nitrogen of plants is evolved. In a great measure this nitrogen is derived from the atmosphere ; and the proportion which it bears to the oxygen given off by the leaves is influenced by the solar rays. Besides the imparting of vital energy to plants, in increased measure, by rain and sunshine, the aged Psalmist may have made allusion to the glorious beauty that clothes the verdure of the garden, field, and woodland, when there is “ clear shining after rain,”—a beauty that the landscape painter attempts in vain to imitate, and which, on the authority of the royal bard of Israel, may be taken as emblematical of that which shall adorn the moral and spiritual world when the “ Sun of righteousness shall arise.”

Plants shut up in a close glass case are enabled, through the agency of light, to keep their limited allowance of air in a pure state, by absorbing carbonic acid and giving out oxygen in the day time, and by reversing the process when light is absent,—absorbing oxygen and giving out carbonic acid at night. Hence the culture of plants in a Wardian case becomes practicable, and affords an illustration of the influence which plants spread over the surface of the earth have in maintaining the balance and purity of the atmosphere. Hence also is rendered apparent the wisdom of the Creator in causing darkness to alternate with light. As light is essential to the elaboration of the sap and the formation of the solid parts of plants, so darkness is necessary to the restoration of gases abstracted from the atmosphere. In regions near the equator the period of light never extends to much more than twelve hours at a time, but the season of vegetation extends over the

whole year. In arctic climates there is no growth in winter, but the sun remains above the horizon during the entire summer ; and in course of that summer, vegetation rushes up rapidly after its winter's rest, the green leaf gaining continually from the air, and never losing what it gains,—no darkness intervening to cause it to suspend its labours in appropriating the carbonic acid of the atmosphere. The rapid growth of a Lapland summer is unequalled in the more languid though more steady vegetation of tropical climes. Darkness and light are thus both essential in the economy of nature ; and the opinion held by ancient heathen mythologists, to the effect that the one is an emanation from the principle of evil, and the other from the principle of good, receives countenance neither from science nor Scripture. “ I am Jehovah, and there is none else. I form the light, and create darkness.” Light stimulates the growth of plants, and darkness affords them rest and

maintains the due balance of atmospherical gases, which, with constant light, would become disturbed.

Without light, plants soon become blanched and colourless, and speedily cease to live. Air is equally essential to their existence, since, if they are placed under a glass receiver, though exposed to light, and having moisture supplied to their roots, they will perish if the air in the receiver be exhausted by artificial means. Moisture, again, is useless when either light or air is withheld, and in the absence of the vital air, light loses its stimulating effects. Thus, in spiritual things, the light of the Gospel may shine without any quickening effect. “This is the condemnation, that light hath come into the world, and men loved darkness rather than light, their deeds being evil.”

Atmospherical agency in vegetation was acknowledged by the naturalists and philosophers of ancient times, and some even maintained that

plants lived entirely on air. In the Bible, the influence of moisture on vegetation is oftener alluded to than that of any other element or agent. This is in consistency with the general plan of the inspired writings. While nothing adverse to the truths of science can be found in the sacred volume, that volume, not having for its object the teaching of the natural sciences, makes frequent mention of such facts, real or apparent, and by way of illustration, as come under the daily observation of mankind. Thus, it is said by the Royal Preacher, that “the sun riseth, and the sun goeth down, and hasteth to his place where he arose;” the apparent motion of the sun being used as one amongst other figurative emblems of the ceaseless changes that occur on the surface of the earth, and in the history of the human race. In warm countries like Palestine, moisture is apparently the most important agent in causing the growth of plants, its absence being immediately manifested by wither-

ing and decay. "A dry and parched land where there is no water," was appropriately used by the Psalmist as an emblem of spiritual destitution.

It is found by experiment that the spongioles at the end of the root fibres of a plant cannot imbibe the solid nutriment that may be contained in the soil, till it has been rendered soluble in water. When manure is applied to a soil, it cannot be appropriated by the plants growing thereon till its saline principles have been dissolved by water; and the same solving element is requisite ere plants can take advantage of the natural richness of the soil. In numerous Scripture passages water is described as the cause of fruitfulness, being a necessary agent in preparing for assimilation that portion of the food of plants which is imbibed by the roots. Besides dissolving the salts of manures, rain-water conveys gases from the air to the soil, and thus a supply of water by means of rain has a more fertilising effect than a supply by any other

means. Water by itself, and uncombined with gases, is of importance in the internal economy of vegetables. Water is composed of oxygen and hydrogen, in the proportions of eight to one, and the water that is absorbed by the roots and leaves of a plant is sometimes decomposed, and the hydrogen or oxygen appropriated by the plant, according as it may require either of these gases for the formation of its substance in any particular part. It has been well remarked by an eminent chemist, that “it is a beautiful adaptation of the properties of this all-pervading compound—water—that its elements should be so fixedly bound together as rarely to separate in external nature, and yet to be thus at the command and easy disposal of the vital powers of the humblest order of living plants.”

It was asked of Job, “Who hath divided a water-course for the overflowing of waters, or a way for the lightning of thunder; to cause it to rain on the earth where no man is; on the

wilderness wherein there is no man; to satisfy the desolate and waste ground, and to cause the bud of the tender herb to spring forth?" Rains, and especially thunder-showers, add to the richness of the soil, by conveying nitrogenous gases from the atmosphere, and bringing them, in a suitable state for absorption, within reach of the roots of plants. Hence vegetation is never so fresh and vigorous as after a thunder-shower; and in the passage just quoted, there is a peculiar appropriateness in the reference first to the bursting of the thunder-cloud, then to rain, and lastly to the budding of the tender herb. The effects of drought are alluded to by Isaiah in these words, addressed to those that forsake the God of Israel,—“Ye shall be as a garden that hath no water.” In the same verse it is said, “Ye shall be as an oak whose leaf fadeth,” an expression of peculiar force, as showing the intensity of that drought which could affect the deeply struck roots of the oak

tree. Peculiar advantages are detailed as belonging to plants, in a warm and dry climate, whose roots are spread out where the soil is naturally moist, from its nearness to a running stream. The “rivers of water” lend moisture to the soil that constitutes their banks. A stagnant pool might do the same for a time, but its waters would contaminate both air and soil, and render them unwholesome. The trees at the side of the river or stream are healthy and fruitful, as well as of rapid growth. “He shall be like a tree planted by the rivers of water, that bringeth forth his fruit in his season.” In the rainless districts of Africa and Arabia, the palm-tree is found growing only beside fountains, or where hidden springs exist below the surface of the ground. “They came to Elim, where were twelve wells of water, and three score and ten palm-trees.” The gracious promises given in old times to the Church are often held forth under the similitude of supplies of water afforded



"By the rivers of Babylon, there we sat down; yea, we wept, when we remembered Zion. We hanged our harps upon the willows in the midst thereof." Psalm cxxxvii. 1.

(SALIX BABYLONICA—THE WEEPING WILLOW.)

to a parched soil. “ I will pour water upon him that is thirsty, and floods upon the dry ground ; I will pour my spirit upon thy seed, and my blessing upon thine offspring ; and they shall spring up as among the grass, as willows by the water-courses.” The rain that will fall on the mown grass—the grass so closely grazed as to have little left but the roots—will cause the meadows to put on a robe of verdure ; and the showers that are to water the valleys in the latter days, will cause the earth to “ bring forth and bud,” the growth being spiritual, and the fruit to the glory of God, and to the honour of Immanuel.

In the summer season, and throughout a great part of the year, in dry and warm climates, the absence of clouds at night favours the deposition of dew on the surface of the earth, and especially on the living foliage of grass and other plants. Dew is precipitated when the body on which it appears has become colder than

the atmosphere; and this coldness is first perceptible in the leaves of living plants. When the sky is cloudy at night, the refraction of heat from the earth into the atmosphere is prevented, and grass is nearly of the same temperature as the air. Cold is the cause of the formation of dew, and not its effect. From a decayed branch, or from dry withered grass, heat is not given out at night to the same amount as from living foliage, and its place is therefore not occupied with a similar amount of cold. If nightly dews are refreshing to vegetation that has been almost parched by sunshine in the day time, vegetable life must previously exist. Dew is withheld where life is absent, save, as in the case of Gideon's fleeces of wool, it is imbibed by capillary attraction. As it is with natural dew, so also it is with regard to the giving of those spiritual blessings of which dew is the chosen emblem. When the backsliding church has again shown signs of life, and has said "take away all iniquity,

and receive us graciously," it is then replied, "I will be as the dew unto Israel; he shall grow as the lily, and cast forth his roots as Lebanon. His branches shall spread, and his beauty shall be as the olive-tree, and his smell as Lebanon." The formation of dew is ascribed in the book of Job to creating power:—"Hath the rain a father? or who hath begotten the drops of dew?" The mode of its deposition is referred to in the song of Moses:—"My doctrine shall drop as the rain, my speech shall distil as the dew; as the small rain upon the tender herb, and as the showers upon the grass." In describing his season of worldly prosperity, Job remarked, "My root was spread out by the waters, and the dew lay all night upon my branch." In the Proverbs of Solomon it is said, that "the king's wrath is as the roaring of a lion; but his favour is as dew upon the grass." "The dead," says Isaiah, "shall live: together with my dead body shall they arise. Awake and sing, ye that dwell in the

dust; for thy dew is as the dew of herbs;" even of living herbs. And it was prophesied by Micah, that the "remnant of Jacob shall be in the midst of many people as a dew from the Lord, as the showers upon the grass, that tarrieth not for man, nor waiteth for the sons of men." To the Gentile nations, converted Israel will be as the rain and dew, a blessing that is continual, unsolicited, and above price; and such a blessing will the King of Israel be to all nations.

In the economy of nature, a decrease of temperature to a certain extent will change water into ice, rain into snow or hail, and dew into hoar-frost. He "who covereth the heaven with clouds, who prepareth rain for the earth, who maketh grass to grow upon the mountains," can, when He seeth meet, send a season of adversity upon the earth, in which the trees shall become leafless, and the grass shall wither. "He giveth snow like wool; he scattereth

the hoar-frost like ashes. He casteth forth his ice like morsels ; who can stand before his cold ?” But as the frosts of winter are useful both to plants and soil, being followed by more vigorous growth in spring, when “ He sendeth out his word, and melteth them,” when “ He causeth His wind to blow, and the waters flow,” so affliction of soul may result in enlarged spiritual prosperity.

Besides moisture, air, and light, heat is essential to the process of vegetation, and electricity is a subtle and mysterious agent. In the geographical distribution of plants, climate has a controlling power ; and that the whole surface of the earth, with the exception of that portion which is perpetually frozen, or which consists of burning sands, may be clothed with plants, some species, such as the common annual meadow grass, *Poa annua*, will vegetate at a temperature of 33°, or but one degree above freezing, while others, such as the palm, can only grow in the

temperature of the torrid zone. The stately British oak is impatient of great heat, and even in some parts of the south of Europe languishes in the form of a shrub. The wise distribution of plants according to climate gives rice and maize as food-producing cereals to warm countries; wheat to countries that are temperate but comparatively sunny and dry, and oats to lands of clouds and mist. Vegetation, in the great majority of plants indigenous to countries in the temperate zones, commences with a temperature of 40° ; hence this has been termed, on Fahrenheit's thermometer, the vegetating point. The ascending sap in plants flows most freely in the daytime, under the combined influence of light and heat; and in spring, it flows most rapidly in plants that have been rendered excitable by having been exposed to severe cold in winter. This leads horticulturists in the climate of Britain to hibernate or winter-harden the branches of vines cultivated in glass structures, by placing

these branches for a time above or without the glass sashes. There is a latent heat in the leaf-bud in winter that acts simultaneously with the returning heat of the atmosphere in spring ; and it is evolved by a kind of partial fermentation, the starch that had been stored in the bud in course of the previous season being now converted into sugar, which imparts sweetness to the sap of the young shoot. In much the same way a chemical change is produced in a seed that is committed to the earth under favourable circumstances as to heat and moisture. The starch and gluten contained in the seed furnish food for a time to the young and newly germinated plant, and also provide the substance of the first descending root ; but these substances cannot be made available till changed into soluble *dextrin*, and further, into sugar. The artificial process of malting barley is merely an imitation of what naturally takes place in the germination of plants from seed—heat and moisture, combined with

darkness, being the essential agents both in the malthouse and the field.

Although sap does not cease moving in winter as long as the temperature in the interior of the stem does not fall below the freezing point, yet spring is the acknowledged season of the sap's ascent, and of vegetable energy. "For, lo! the winter is past, the rain is over and gone; the flowers appear on the earth; the fig-tree putteth forth her green figs, and the vines with the tender grape give a good smell." Parkhurst says of this passage that it is "evidently descriptive, not of the beginning, but of the end of spring, or of the beginning of summer. For, among other marks of the season, it is observed that the rain was over and gone; but the latter rains in Judea fall sometimes in the middle, sometimes towards the end of April, O.S."

In a terraced vineyard, a vineyard in "a very fruitful hill," a greater amount of heat is refracted from the earth than when the vines are

planted on level ground—a necessary requirement for this being that the terraced slopes are exposed to the *slanting* rays of the sun, being at some distance from the equator. In Palestine this may not have been the principal object of terracing; but terracing and sloping to the south are essential in open air culture of the vine in countries somewhat farther north. If well supplied with water in warm countries, the fruit-trees will produce both juicy and saccharine fruit; but in colder climates some kinds of fruit will not reach maturity without artificial heat. With abundance of heat in the summer season, the Hebrew cultivators had to attend to the supply of water as a main object; and hence it is not said that Solomon chose a warm, sunny, and sheltered situation for his gardens and orchards, as he would have done had the climate of Syria been like that of Britain; but it is recorded that he made him “pools of water, to water therewith the wood that bringeth forth trees.”

Cold, as well as heat, is an agent in vegetation. The winter's frost renders plants excitable, and more easily stimulated by the light and heat of spring. The amount of heat given off by the earth at night, and especially in clear nights, when there are no refracting clouds, prevents that accumulation of heat from the solar rays which, were sunshine perpetual on every part of the globe, would soon destroy, not only vegetation, but the earth itself. There is here another instance of the wisdom of that arrangement, by means of which darkness alternates with light, and night with day.

Cooling breezes in the heats of summer were welcome in an Israelitish garden :—"Awake, O north wind, and come, thou south ; blow upon my garden, that the spices thereof may flow out. Let my beloved come into his garden, and eat his pleasant fruits." The invitation to the Beloved to come into his garden in a time of fragrant and cooling breezes, incites us to think

of that time when, in rich grace and forbearance, He visited lost Eden, where such breezes of a natural kind still fanned the fair scene, but where there was no more spiritual fruit to rejoice in. “They heard the voice of the LORD God walking in the garden in the cool of the day, [or the *wind* of the day ;] and Adam and his wife hid themselves from the presence of the LORD God, amongst the trees of the garden.”

Rains and drought, storms and calms, cold and heat, result from various counteracting agencies in the system of the universe, and all combine to maintain the necessary balance in the elements of nature ; thus showing forth the wisdom, power, and goodness of Him who is the Ruler of the seasons, and who gave it in promise to Noah, that “while the earth remaineth, seed-time and harvest, and cold and heat, and summer and winter, and day and night, shall not cease.” Variations in the regular course of the seasons may occur ; there may at times be “snow in

summer, and rain in harvest ;” but this may be designed to show the cultivators of the soil their dependence on Him, unto whose will what philosophers call the “ Laws of Nature ” are and must be obedient.

In some warm countries harvest comes after winter, and before the burning heats of summer commence. In Syria and other adjacent countries, such words as “ the harvest is past, and the summer is ended,” would not be regarded as misarranged. In Palestine the wheat and barley harvests do not occur at the same period of the year. Naomi and Ruth came to Bethlehem at the beginning of barley harvest ; and in the time of wheat harvest, Samuel called unto the Lord that He might send thunder and rain, to cause the Israelites to perceive that their wickedness was great.

CHAPTER III.

THE ARTS OF CULTURE.

THE art of husbandry, including the culture of the soil and the keeping of live stock, is of greater antiquity than the art of hunting wild animals; though it is nevertheless true that, in the history of nations, an ascent from barbarism to comparative civilisation is marked by an attention to agriculture and gardening on the part of those whose ancestors had subsisted on roots dug from the soil, or on the products of the chase. In the history of the world, as known by tradition, the hunter has given place to the husbandman; but the sacred records testify that agriculture preceded the art by which Nimrod gained his fame, and that the first occupations of

the sons of Adam were the tilling of the ground and the keeping of sheep. The curse pronounced against sin was to be removed through faith in an atonement; and the provision made for this removal included the preservation of the world as the scene of man's probation, and the maintenance of such a degree of fertility in the soil as would enable it, though cursed for man's sake, to yield such an increase as would repay the labour expended on its cultivation. Regarding the agriculture of the ages before the flood nothing is known, saving that it comprised both grazing and tillage. Shortly after that event, or in the patriarchal times, the state of agriculture seems to have been similar to what it is in the countries of the patriarchs at the present day. There were landmarks in the days of Job; and Abraham purchased a field for money. The vineyard of Noah may have been regularly enclosed, and that patriarch may have been familiar with the art of enclosing or fencing, in

the antediluvian portion of his life. In the patriarchal times, some dwelt in tents and led a wandering life, while others, even of the agricultural classes, dwelt in towns and cities, while their flocks ranged in suburban meadows. Isaac, when in Palestine, sowed and reaped an hundred fold. Corn was raised in abundance in Egypt; and that country in the time of Joseph became the granary of the nations. Irrigation was taught to the inhabitants of neighbouring countries by the effects resulting from the overflowing of the Nile; for it is said that the plain of Jordan was watered everywhere, "even as the garden of the Lord, like the land of Egypt," before the overthrow of Sodom and Gomorrah. The traditions of heathen nations ascribe the invention of agriculture to fabulous personages; Ching, successor of To-hi, being styled its originator by the Chinese; Osiris, by the Egyptians; Ceres and Triptolemus, by the Greeks; and Janus, by the Romans. On the conquest of

Canaan by the Israelites under Joshua, each tribe had its territory assigned it by lot; and the land was equally divided amongst the heads of families. In course of time the family estates varied in extent. Boaz inherited no fewer than three estates. In the time of Nehemiah lands were mortgaged that corn might be purchased in a season of famine; and the practice of dealing in land, and alienating inheritances, must have become common in the days of Isaiah, who pronounced a curse on those "that join house to house, that lay field to field, till there be no place, that they may be placed alone in the midst." In Palestine, the out-field and in-field mode of dividing land was common, as it was in Scotland up till the commencement of the present century. The in-field portions were enclosed, while, as in Scotland, the out-fields were pastured in common, or, when sown with corn, were allotted to the different holders in small portions. When Ruth came to glean after the reapers, "her hap

was to light *on a part of the field* belonging unto Boaz." Amongst the Israelites, every proprietor cultivated his own land. The crown-lands of King David were managed by seven officers; the seven departments being these:—Tillage, vine-culture, olive-culture, cattle, camels and asses, sheep, and the storing of produce. King Uzziah "built towers in the desert, and digged many wells; for he had much cattle, both in the low country and in the plains; husbandmen also and vine-dressers in the mountains, and in Carmel, for he loved husbandry." The art was held in high esteem by the kings and nobles of Israel; and was honoured by the selection, from amongst those who practised it, of some of the Hebrew warriors, kings, and inspired prophets. Elisha, when called to follow Elijah, was ploughing with yokes of oxen. Both asses and oxen were used in field labour; but as the steps of oxen and asses are unequal and their progress different, it was forbidden by the law of Moses,

(a law in various instances manifesting a merciful regard to the comfort of those brute animals that had been appointed to aid the labours of the cultivator), to yoke an ox and an ass together. From the advanced state of Hebrew agriculture in the time of Solomon, that wise king was enabled to supply the Tyrians with field produce, in return for the services which they rendered him. The gardens of Solomon and other kings of Israel were laid out with a view to beauty combined with utility.

SECT. I.—THE FUNCTIONS OF PLANTS AS AFFECTED
BY THE CULTURE OF THE SOIL.

The culture of the soil lies at the foundation of the arts of gardening and husbandry. In Eden, the office of Adam as cultivator was to “dress and keep” the plants which the soil naturally produced; but when through sin he

left the “ garden which the LORD had planted,” he had, for the sake of bodily sustenance, to become a “ tiller of the ground ;”—of that ground on which, because of sin, a curse had been pronounced. A like difference is conceivable in the moral and religious culture applicable to fallen and unfallen intelligent creatures. In Eden, neither physically nor spiritually was there any occasion for the injunction of the prophet, so applicable to the Jews when it was pronounced ; —“ Break up your fallow ground, and sow not among thorns.”

Though light is a necessary agent in the growth of the plant, the germination of the seed proceeds best in darkness, but when the soil that covers it is so pulverised as to admit a free supply of air. It is necessary in cultivation that the seed should be covered over, to a greater or less depth according to its kind, by the surface soil. “ Verily, verily, I say unto you,” was the language of the Son of Man, in prospect of

that hour when he should be glorified, “except a corn of wheat fall into the ground and die, it abideth alone; but if it die, it bringeth forth much fruit.” When the rootlet descends and the seed-blade appears above the surface, nourished for a time by some of the substances contained in the seed, what remains of the substance of the seed decays. The nutritive matter contained in the seed is appropriated by the plant for its own use. The seed loses its vitality in imparting life to the plant. “That which thou sowest is not quickened except it die.” The mystery of the resurrection is hereby illustrated, though neither in the resurrection of dead and corrupted bodies, nor in the growth of a plant from the seed, does there cease to be a mystery. “So, when this corruptible shall have put on incorruption, and this mortal shall have put on immortality, then shall be brought to pass the saying that is written, Death is swallowed up in victory.”

The germination of the seed in darkness, unseen by the eye of the sower, corresponds with the hidden way in which the seeds of grace spring up in the soul. "So is the kingdom of God, as if a man should cast seed into the ground ; and should sleep, and rise night and day, and the seed should spring and grow up, he knoweth not how." "He that ploweth shall plow in hope." "They that sow in tears shall reap in joy. He that goeth forth and weepeth, bearing precious seed, shall doubtless come again with rejoicing, bringing his sheaves."


The art of culture, like all other arts, is learned from Divine teaching. He who taught Bezaleel and Aholiab how to ornament the tabernacle, communicates to the husbandman that knowledge which enables him to adapt the plants which he cultivates to soil and climate, and to prepare the soil for the reception of their seed. "Give ye ear, and hear my voice," was said by Isaiah to rebellious Ephraim ; "hearken and

hear my speech.” Words of importance are to be uttered when attention is called in language like this. But whither does the prophet go for arguments to enforce his threatenings against the “crown of pride?” From the art of husbandry he brings illustrations of the wisdom, power, and omniscience of Him whom Ephraim had offended. “Doth the plowman plow all day to sow? doth he open and break the clods of his ground? When he hath made plain the face thereof, doth he not cast abroad the fitches, and scatter the cummin, and cast in the principal wheat, and the appointed barley, and the rye in their place? For his God doth instruct him to discretion, and doth teach him.” And so, after describing the realisation of the farmer’s labours, the thrashing with flail and with cart wheel, and bruising of the bread corn, he concludes by saying, “This also cometh forth from the LORD of hosts, which is wonderful in counsel and excellent in working.” Jehovah of sabaoth, the Crea-

tor and Ruler of the universe, praised by angelic hosts who obey his commands,—He directeth the husbandman how to cultivate his field; and it is by His power that the seed springeth in darkness—by His power without whose permission a sparrow cannot fall to the ground. Rebellious Ephraim is threatened because of all this; but in the midst of the threatening, mention is made of grace.

All the elements and agents of vegetation, with the exception of light, are essential to the process of germination; and light acts on the seed-blade of corn, and the seed-leaves or cotyledons of other plants, whenever these pierce the soil. When the seed has been sown, the husbandman waiteth for those atmospherical influences, without which even the “good seed” might be sown in vain. Amongst the threatenings pronounced against Israel by Moses, in case of disobedience to the commands of God, were these:—“Thy heaven that is over thy head

shall be brass, and the earth that is under thee shall be iron,"—"Thou shalt carry much seed out into the field, and shall gather but little in." Besides the reason given, that "the locust shall consume it," there is another implied; for amongst the promises of blessings for obedience given on the same occasion, rain from heaven in due season is included; whilst amongst the threatenings for disobedience, it is declared that the rain of their land would be powder and dust. Their land would be exposed to those burning desert winds, of which they had experience in course of the forty years of their sojourn in the wilderness; and to which the Psalmist makes allusion, when he says of the flower of the grass, "the wind passeth over it, and it is gone." The literal fulfilment of this threatening has altered the face of that land which once flowed with milk and honey, though the elements of fruitfulness still exist in its soil, ready to reward the labours of its cultivators in the latter days.



The breaking of the soil into minute particles by the use of the plough, harrow, roller, and other implements of tillage, allows free access to the air, the oxygen of which aids in preparing the food contained in the earth for being used by the roots. This food is organic, or composed of decayed animal or vegetable matter, or it consists of mineral substances. The manuring mentioned in the Bible may refer chiefly to the supply of organic vegetable food to the soil, though the application of certain mineral manures was known in ancient agriculture. By the Mosaic law, the Israelites were commanded to rest their land every seventh year; the injunction having a reference to the weekly sabbath, ordained at the creation, and the year of jubilee, a year appointed to be observed by the Israelites as a nation. In modern agriculture, fallow ground is wrought repeatedly, so as completely to pulverise it and free it from weeds; and it thus differs in character from the seventh-year's

fallow of the Hebrews, on which weeds had full liberty to grow; necessitating the injunction—made, however, in a spiritual sense—“Break up your fallow ground, and sow not among thorns;” or amongst those weeds that had taken possession of the soil in course of the season, in which it had received no culture.

Soil, improved by manure or otherwise, and so rendered more fit for yielding a large amount of produce, furnishes a Scripture illustration of the spiritual change that is made on those of whom it was said by the Apostle, “Ye are God’s husbandry.” Although a proportion of small stones in a field is beneficial rather than otherwise, yet it is necessary, when large stones are numerous, or when rocks approach the surface, to remove them, their presence interfering with the operations of culture. The church is styled a garden in a fruitful hill, out of which the stones are gathered. The seed sown in stony or rocky soil had no deepness of earth, and the

plants which sprung from them were consequently soon scorched by the sunbeams. The Church is also "a garden enclosed." "My beloved had a garden in a very fruitful hill; and he fenced it." The fence is necessary for protection, and in some climates, for shelter. In Palestine, fences to field-gardens, fields, and vineyards, were necessary for protection from wild beasts—that the "boar of the forest" might not waste these fair scenes at his pleasure, nor the "wild beast of the field" devour their valuable produce.

The preparatory culture bestowed on the soil, and the manure which it receives, may be equally beneficial to the weeds, the seeds of which may exist in it at the time when the good seed is sown. Hence after-culture is necessary, such as hoeing and weeding. Some plants, such as the bindweed (*Polygonum convolvulus*), twist their stems round those of stronger plants growing beside them; and others, such as plants of the tare and vetch kind, of which *Ervum hirsutum* is

a familiar example in British corn fields, enclasp their neighbours with those tendrils wherewith many weak-stemmed plants of this order are furnished. These are allowed "to grow till the harvest," because, if it were attempted to root them up, the corn plants might be pulled up with them. There are other free-growing weeds, however, which are uprooted by the careful cultivator whenever they appear. In the similitudes used by Him who "spake as never man spake," there is a minute truthfulness in every particular, which in most of human allegories may be sought for in vain.

Although genial showers fall timeously in Canaan, unless at such sad times as when there was neither rain nor dew on the mountains and plains of Israel for years, it is evident that irrigation must have been resorted to occasionally, if not often. Pools of water were formed in the gardens of Solomon; and in some places "upper and nether pools" may have been

formed for the express purpose of irrigating the ground at different heights. The water of irrigation supplies more or less of enriching principles to the soil, according to its want of purity ; but in dry and arid climes, where rain seldom falls, its main effect lies in affording that supply of moisture which is necessary for calling the natural fertility of the soil into action. In level countries, such as Egypt, it becomes desirable to raise water from the rivers to canals at a greater height, that it may be conveyed to the fields ; and this was done in ancient times by rude machines, driven by the pressure of a man's foot. Hence the origin of the phrase " watering by the foot." This phrase has also been explained as meaning the turning by the foot of the water into the small rivulets that run through the fields, and which, some think, are the " rivers of water " of the first Psalm.

The cultivation of the soil has a large influence on the growth of plants, and the development of

their parts. By culture, the stamens of some flowers are changed into petals, and the flowers become double. Many plants, in a state of cultivation, become what florists term sporting plants. Their seed produces numerous varieties of the original species, though all retaining its specific characteristics, and its name. This tendency in cultivated plants to produce varieties has led to much improvement in the arts of husbandry and gardening. By natural and artificial hybridisation, the varieties of plants under cultivation are indefinitely increased, though the number of the true species has remained the same. When the florist, the gardener, or the farmer, sows a quantity of seed produced by a sporting plant, he does not expect, even though artificial hybridisation may have been practised, that the progeny will consist uniformly of improved varieties; or even that they will all equal in merit the parent plant. On the contrary, he fully expects that the greater proportion

will prove inferior, and is content if a very small proportion show tokens of improvement. Some will be found greatly inferior to the plant from whence the seed was taken; showing signs of reversion to the features of the plant in its wild and uncultivated state. Thus it was in the ancient Hebrew vineyard, the “fenced garden” of the LORD:—“Yet I had planted thee wholly a right seed: how then art thou turned into the degenerate plant of a strange vine unto me?” “What could have been done more to my vineyard, that I have not done in it? Wherefore, when I looked that it should bring forth grapes, brought it forth wild grapes?”

But it is none the less true, whether in natural or spiritual concerns, that evil seed shall yield evil produce, and that it is from good seed, or seed of a good kind, that favourable produce can be expected. In the words of Eliphas, “They that sow wickedness shall reap the same;” and in those of Solomon, “To him that soweth

righteousness shall be a sure reward." "They have sown the wind," was said by Hosea, "and they shall reap the whirlwind: it hath no stalk; the bud shall yield no meal: if so be that it yield, strangers shall swallow it up." "Sow to yourselves in righteousness, reap in mercy."

It may be said, in objection, that the expression "wholly a right seed," precludes the supposition of the seed being in any way the cause of degeneracy in the vine; and some have thought that the wild grapes produced in the vineyard so carefully cultivated by the Great Husbandman in ancient times, according to the allegory in the fifth chapter of Isaiah, were mildewed grapes, or grapes affected, in ordinary language, by disease. It was, however, from "right seed," that the degenerate plant of the strange vine was produced; and this degeneracy in the plant could not be explained by reference to the accidental growth of a minute parasitical fungus on the fruit.

Sowing, especially sowing upon the waters, is used as an emblem of charity and of faith. "Cast thy bread upon the waters, and thou shalt find it after many days." The Egyptian bean of Pythagoras is supposed to have been the seed of *Nelumbium speciosum*, the "mythic lotus" of Egyptian and Hindu monuments, and the beautiful "rose of the Nile." The seeds of this aquatic plant were enclosed by the ancient Egyptians in balls of clay or mud, mixed with chaff, and cast into the Nile; and after "many days," the beautiful leaves of the nelumbium appeared above the surface of the waters, followed in due time by flower-buds, flowers, and seeds. This plant, it is said, no longer adorns the waters of Sihor, but its seeds are sown in the same way by certain Indian tribes in the Hindu peninsula, in the present age, and the roots are used for culinary purposes by the Chinese. The common white water-lily of Britain is cultivated by casting pieces of the large fleshy roots, or root-stems,

into lakes and rivers, stones being attached to them to cause them to sink into the mud at the bottom. The seeds of the lotus were of much value in ancient Egypt as an article of food; and the economical produce of this beautiful plant is used by Isaiah as typifying the whole of the commercial produce exported from the Nile by the ships of ancient Tyre,—“ By great waters the seed of Sihor, the harvest of the river, is her revenue; and she is a mart of nations.” And in the prediction of Egypt’s desolation, it was said by the same prophet, that the aquatic plants of the river would wither away, the river itself being wasted and dried up.

SECT. II.—OPERATIONS OF CULTURE AS PERFORMED
ON INDIVIDUAL PLANTS.

While new generations of plants are raised from seed, individual plants are propagated by



"Cast thy bread upon the waters: for thou shalt find it after many days."

Eccles. xi. 1.

(*NELUMBIUM SPECIOSUM*—THE SACRED BEAN.)

cuttings, layers, suckers, slips, offsets, runners, and division of the roots. A species or variety of any ligneous plant may be propagated on the stem of another plant of kindred nature, by budding and grafting, and by the kind of grafting termed inarching, by which mode each branch is supplied with sap from its own root till the union between the two branches has been effected. To the art of grafting special reference is made in the Bible; and the art of propagation by cuttings and suckers must have been well known to the Hebrew cultivator. Doubtless Noah planted cuttings of the vine (*Vitis vinifera*) in the vineyard which he formed; and in ancient olive gardens, as in the oliveyards of southern Europe in modern times, it is likely that the olive was propagated by suckers, or by large cuttings planted in deep trenches. Into these trenches, which are made about four feet in depth, it is still the custom, as it was in the days of Virgil, to deposit stones for encouraging the retention

of moisture about the roots. The olive (*Olea Europæa*) is not cultivated by grafting, though the process may have been performed on individual plants. The European olive, which, though so called, came as a cultivated tree originally from Asia, and is now naturalised in the south of Europe, is an evergreen tree, but of low stature; and it has, like other cultivated plants, many varieties, the principal of which are the long, the broad, and the box-leaved, the twisted-leaved and the ferruginous, the under surface of whose leaves are of a rusty iron colour. The wild olive of Paul may be regarded as *Olea Europæa* in an uncultivated state, in which state its fruit is of inferior quality. There are other species of *olea*, the most of which, however, are regarded in the countries where they grow as ornamental rather than as useful shrubs. While a vineyard will last without renewal of the plants for two or three hundred years, an oliveyard will last for an indefinite period. It is supposed

that there are olive plantations in Italy that have existed since the time of Pliny ; and there is nothing improbable in the idea that some olives now growing on the site of Gethsemane were growing there on that awful night when “ the Son of Man was betrayed into the hands of men.”

The olive is of such easy culture in favourable climes that grafting is unnecessary. When a tree has become too old for bearing, its stems or branches are cut into little pieces, each having a small portion of bark ; these are dipped in manure and planted thick in a bed, covered with three inches of earth ; and, after receiving the ordinary culture of nursery trees, the plants that arise from them are removed in three years to the olive plantation. The olive in Britain requires protection from frost ; it is propagated by cuttings, but has also been grafted on the common privet (*Ligustrum vulgare*), which claims botanical affinity with it, though belonging to a

separate genus. In the same way an apple or pear may be grafted on the quince, and a peach on an almond. But in all cases a botanical affinity must exist between the graft and the stock. The arts both of grafting and budding are founded on the affinity of the elementary organs contained in and between the wood and the bark of species or varieties operated upon. As the stock and the scion must be thus akin in their nature, so it is essential that the human soul, even in its fallen state, should be possessed of those talents, faculties, and susceptibilities which fit it, under the grace of God, for receiving and profiting by "the engrafted word." "God hath made man upright; but they have sought out many inventions." "Thou answeredst them, O LORD our God: thou wast a God that forgavest them, though thou tookest vengeance of their inventions."

The simile raised by the Apostle James from the process of grafting, differs in its nature and

object from that made use of by the Apostle Paul when he refers to the grafting of the olive. The "engrafted word" of James bears analogy to the scion of the cultivator, which he takes from a superior species or variety, and grafts upon a comparatively worthless stock. Paul, in supposing the case of a wild or inferior olive grafted on a good stock, refers to the advantages which the scion experiences as partaking of the culture applied to the good olive into which it is grafted. The distinction is important, as tending to prevent a false and unscientific construction from being put upon Paul's beautiful allegory.

The Apostle James imagines a good shoot, which he compares to the word of life, being grafted on a stem of itself worthless and unfruitful. "Wherefore," he says, "lay apart all filthiness and superfluity of naughtiness, and receive with meekness the engrafted word, which is able to save your souls. But be ye doers of the word, and not hearers only, deceiving your

own selves.” From every part of the process of grafting, appropriate similitudes may be drawn. The necessary incisions made by the knife may be compared to the means taken for the awakening of the soul dead in sin. It is indispensable to success in grafting that the scion fit closely to the stock, in order that, by capillary attraction, the sap may ascend from the severed vessels of the one to those of the other : and it is necessary to exclude air by tying the scion firmly on, and by covering the part with grafting wax or prepared clay. This may answer to the expulsion of worldly motives and prejudices from the soul which is to receive the word—the “laying aside of all filthiness,”—as no substance whatever must come between the scion and the stock. “If any man love the world, the love of the Father is not in him. For all that is in the world, the lust of the flesh, and the lust of the eyes, and the pride of life, is not of the Father, but is of the world.” All “superfluity of naughtiness” must be laid

aside. The regenerated soul gives up all that was inconsistent with the full direction of its energies towards the received truth ; just as, in order to throw all the vital energy of the stock into the graft, all buds that appear upon it, and all suckers that arise from its base, are removed by the cultivator.

The tree is passive under the hands of the operator, like clay in the hands of the potter. It refuses not to take on the good shoot ; but rather lends its functions and energies to promote its growth. It receives the shoot as if with meekness. So the converted sinner receives with meekness the engrafted word ; and towards that word the whole natural faculties of the old man get a bias, and help to develope it. "Ye are bought with a price : therefore glorify God in your body and in your spirit, which are his." Thus received, the word is "able to save the soul." When a wild or crab stock has a good shoot grafted thereon, the two combine to form

a valuable tree ; but if such a stock remains ungrafted, or if, the process of grafting having been performed unsuccessfully, the graft fails to grow and unite with the stock, that stock either grows into a worthless tree, or is cut down or uprooted and burned. Yet, though the graft may once and again fail in effecting a union, the cultivator may be pleased to spare it for another, and yet another season, repeating the process till success is attained ; or finally uprooting the stock, if by repeated shortening it has become too low for the purpose. “ Now then we are ambassadors for Christ, as though God did beseech you by us : we pray you in Christ’s stead, be ye reconciled to God.” “ Oh that thou hadst hearkened to my commandments ! then had thy peace been as a river, and thy righteousness as the waves of the sea.” “ I am not ashamed,” says St Paul, “ of the Gospel of Christ ; for it is the power of God unto salvation to every one that believeth, to the Jew first,

and also to the Greek." "It is the Spirit that quickeneth ; the flesh profiteth nothing : the words that I speak unto you they are spirit and they are life."

Were the wild olive grafted on a good olive-tree, its fruit might be improved in size. This would result, however, not from any virtue resting in the operation of grafting, but merely because the graft would receive culture to which it had, in its wild state, been unaccustomed. Paul was learned in the wisdom of the ancients, who knew much of the phenomena of vegetable life ; and even had he been unlearned and ignorant of worldly science, it would have been impossible for him, when writing under the guidance of inspiration, to have used any emblem that would have presented inconsistencies with regard to scientific truth. And yet such inconsistencies are apparent when, as is sometimes done, Paul's argument is made to rest on the fabulous notion that the stock changes the nature

of the graft, and imparts thereunto its own qualities.

In the economy of the plant, the importance of the root is more evident to the natural senses than that of the leaves. And especially in a warm country like Palestine, there was a peculiar appropriateness in giving an important place to the root amongst the members of a plant, and a chief place to rain and moisture amongst the agents of vegetation. In seeking to understand Paul's allegory of the wild and good olive, it is necessary to view it in the light of such considerations as these.

“If the root be holy, so are the branches.” It was said by Jeremiah, regarding the Jewish nation,—“Jehovah called thy name, A green olive-tree, fair, and of goodly fruit.” Of this olive-tree Abraham was the root, and his descendants by the line of Isaac and Jacob were the branches. The Apostle contends that holiness and devotedness to God should characterise the

branches as well as the root. Some branches were cut off as barren, and because, in a spiritual sense, they despised their connection with the root. "If thou boast," says Paul, "thou bearest not the root, but the root thee." The sap ascends from the root, and the root is therefore of primary importance. The Apostle draws attention to this truth; and his subject does not lead him to describe the peculiar features of importance attached to the leaves and other parts of the plant.

When the olive is propagated by cutting the old branches into small pieces, and covering these with soil, some of the pieces, as being apparently of less value than the others, may be rejected by the cultivator, and thrown aside in waste ground, or amongst rubbish, where some of them may grow. The plants that arise from these will, from want of cultivation, show a reversion to the features of the wild olive. In this and other ways, the olive has escaped from cultivation,

and become naturalised in many parts of the world of which it was not originally a native. Scions, taken from those plants that have reverted to a state of nature, and engrafted on good stocks, will lose their wildness, and again show marks of culture. “ They also, if they abide not still in unbelief, shall be grafted in ; for God is able to graft them in again.” When a fruit-tree, such as an apple, is raised from seed, it may, if left to itself, not bear fruit for many years ; but the time of fruit-bearing may be hastened by cutting off scions, and grafting them on an older stock. Even if grafted on the same tree from which they were cut, their time of fruit-bearing will be hastened ; the cause resting in that wise provision in nature, because of which a plant that has received an injury, such as to lessen its supply of sap, or that has been transplanted into a thirsty soil, makes an effort to propagate its species, by expending its energies in the formation of flower-buds. When the branch that was

broken off the stem, of which the "father of the faithful" was the root, is again grafted in, abundance of fruit will speedily follow.

"Thou wilt say then, The branches were broken off that I might be grafted in. Well, because of unbelief they were broken off, and thou standest by faith : Be not high minded, but fear. For if God spared not the natural branches, take heed lest he also spare not thee." When a cultivator takes scions for grafting from a known and approved variety of fruit-tree, he knows that the grafts, if they grow at all, will become branches bearing leaves, flowers, and fruit, exactly similar in specific character to those of the tree from which the scions were taken, though the fruit may in some cases vary slightly in size and flavour. Beyond this, the stock has no power to alter the characteristics of the scion. Should the scions have been taken from a tree of those kinds that sport into numerous varieties, and which has been raised from seed, but has

never borne fruit, it may be found, after fruit-bearing has commenced, that the variety is comparatively worthless, and the branches will consequently be condemned, and the stock, perhaps, grafted afresh. New and improved varieties of the commonly cultivated fruit-trees are obtained by sowing the seed of approved kinds; that seed, perhaps, partaking of the character of two varieties, the flowers having been artificially hybridised, or else hybridised in an accidental manner by bees, in gathering the fructifying pollen of the anthers for their own use. By grafting, these new varieties are propagated continuously, without losing the qualities or features that characterise them. The two parts of a grafted tree, the scion and the stock, retain their respective peculiarities after the union has been effected. The scion in a manner identifies itself with the stock, and grows upon it as upon its natural stem and roots; still, the distinction of variety or of species remains. If the scion be

taken from a faster growing variety than the stock, the stem above the graft will be, in course of time, thicker than that portion of the stem below the point of union; and if at any future time the stem be cut over, at, or under that point, the stock will throw out branches that will show its original character. The pear has little of the quince in its character, though grafted thereon; and the olive, though grafted on its kindred plant, the common privet of our hedges, remains an olive still. Improved varieties of the apple and pear are often propagated by being grafted on wild or crab stocks; hence it is evident that the scion merely derives sap from the stock, maintaining its own nature and features. It is not, therefore, by means of anything connected with the art of grafting that the wild olive can be improved, by being grafted on a good olive stock. But such a supposition has been made by commentators unnecessarily. The Apostle is not referring at all to fruit-bearing in

the passage; but merely draws an illustration from the advantages as to support and the supply of sap from a root planted in cultivated soil, of which the scion of the wild olive in its new position would partake. Had the improved quality of the fruit been a fit illustration of the idea in the Apostle's mind, he would have found an appropriate simile in the simple art of culture, without reference to the operation of grafting. If a graft is put on a strong healthy stock, it makes vigorous shoots, thus receiving advantage from the health and strength of the stock. By being united with that olive-tree of which Abraham was the root, the Gentiles were admitted to the privileges of church-membership, and the "joyful tidings" were proclaimed in their ears; but the Apostle seems to guard against the false construction that has been put upon his allegory, by placing the responsibility in regard to growth, not on the original root, but on the engrafted branches,—not on the Church, but on the mem-

bers which, under the covenant of grace, had been admitted to be partakers of its privileges. The idea that the stock communicates its good qualities to the engrafted scion, might be, if it were in consistence with fact, of use to those who profess to depend on church-membership for salvation, ascribing to the outward art of baptism an unwarranted virtue. "Behold, therefore, the goodness and severity of God: on them which fell, severity; but toward thee, goodness, if thou continue in his goodness: otherwise thou also shalt be cut off." In the state of union, the engrafted branches partake of the "root and fatness of the olive-tree;" but it is on the leaves of those branches that light and air, and the other elements in vegetation, act in causing the development of the plant in its various parts, giving substance to its timber, colour to its flowers, and richness and maturity to its fruit. In the branch of the fruit-bearing olive, there is

a manufactory of the essential oil of the plant ; and only a part of the requisite materials comes up the stem from the root.

The Apostle well describes the grafting of a wild into a good olive as “contrary to nature.” Such an operation would be at variance with the general practice of cultivators, and not commendable on scientific grounds.

The term *grafted*, used in the English New Testament, is said literally to mean *punctured*. If so, the process of budding may have been alluded to by Paul—a process which, it is absurdly stated by a commentator on the passage, consists in “inserting a bud of another tree into a puncture of the bark of a tree *esteemed good*.” In budding, as in grafting, the proceeding branch retains and perpetuates the qualities of the tree from which the bud was taken. Hence, by budding, roses of every variety of shape, size, and colour, may be got to grow on the same

stem. The sentence above quoted would read more correctly if its concluding word were changed from *good* to *inferior*.

In the process of grafting, which is conducted in various ways, it is necessary to cut the scion in a slanting direction with a sharp knife, so that it may fit closely to its destined place on the stock; and that provision may be made for the straight descent of the *cambium*, or elaborated sap, under the bark both of scion and stock. The descent of the cambium, like the ascent of the sap, is a mysterious process. It descends between the bark and the alburnum, forming a new woody layer; and it is after one such layer has been formed that the graft is really and permanently united to the stock; since, though the sap ascends in the first place from the alburnum of the stock to the severed sap-vessels of the scion, no union takes place in these parts; and when the tree is cut down and split up after a lapse of years, the slanting cut made by the

knife in grafting is again made visible. That a real union between stock and scion may be effected, there must be life and growth—a descent of cambium from the leaves, as well as an ascent of sap from the roots. When life has been manifested by the scion—when it has put forth leaves, and when from these leaves the elaborated sap has descended towards the roots, forming a woody layer in accordance with the nature of the scion above, and of the stock below, the place of contact, then the scion and the stock may be reckoned, in as far as vegetable growth is concerned, as members of one tree. “Now, therefore, ye are no more strangers and foreigners, but fellow-citizens with the saints.” The descent of the elaborated sap, now become a limpid but viscous fluid, and its assimilation by the parts of the branches, stem, and roots already formed, are processes which cannot be clearly explained by referring to natural causes. Wherever there is life, there is, to human understanding, mystery;



" Abide in me and I in you. As the branch cannot bear fruit in itself except it abide in the vine ; no more can ye except ye abide in me."

John xv. 4.

(VITIS VINIFERA—THE VINE, IN FRUIT.)

and herein are involved the vital energies and affinities of the plant.

Life is essential to the formation of a union between the scion and the stem ; and, whether in the case of an engrafted or a natural branch, there must be a continuance of the exercise of vital energy, if such union is to be maintained. “ Abide in me, and I in you. As the branch cannot bear fruit of itself, except it abide in the vine, no more can ye, except ye abide in me.”

The vine is generally propagated by cuttings and layers, or by buds or eyes, planted in soil. The operations of culture applied to the vine after it has become an established plant, include pruning and training in all climates, and, in cold countries, the supply of heat, water, and air, by artificial means, as also the ripening or maturation of the young wood, and its resting, or hybernation. The time of pruning is regulated by the tendency of the vine at certain seasons to *bleed*, or emit sap at the wounded parts. The fruit-

promising branch on the vine is known when the flower-buds appear, these being easily distinguishable from the leaf-buds, or those that will only produce leaves and young branches. A branch that presents nothing but leaf-buds is cut off by the vine-dresser. "Every branch in me that beareth not fruit, he taketh away." The vine requires summer as well as winter pruning, the superfluous young shoots and leaves being taken away in course of the summer to prevent overcrowding, and to throw more sap into the fruit-bearing branches.

In that style of profusion which characterises the works of the Great Author of Nature, when the various means used for maintaining the balance of created things become at times liable to waste and loss, the quantity of fruit and seeds produced by plants is far greater than is required for keeping the surface of the earth clothed with vegetation,—and by cultivation this quantity is indefinitely increased. Seeds and fruit were

created for animal sustenance, as well as for vegetable propagation. But under cultivation some plants put forth more fruit than they are able to bring to maturity. While the wild apple retains all its fruit till it is ripe, the orchard-tree is relieved of its inferior apples, and those which, even if they were to remain on its branches, would never come to right maturity, by the heavy showers and high winds that sometimes occur in summer. Fruit-trees that are trained to a garden wall are not liable to be shaken by the wind, and have therefore often to be thinned of their superfluous young fruit by the cultivator. The vine in a wild state produces fruit of inferior size and quality, but it is able to bring all that it bears to maturity. The cultivated vine produces more berries than have room or sustenance to enable them to swell freely on the clusters; and if these are allowed to grow without thinning, the weight of fruit is less than if the usual and requisite thinning had been

given. In order that they may have room to swell freely and fully, the vine cultivator thins the bunches of grapes, varying the process according to the requirements of the variety where-with he is dealing. Some kinds require only the small, watery, and seedless berries to be taken out, while others, whose berries naturally grow closely together, require a regular thinning, to the extent of one-third or one-fourth of the berries in each cluster. When the clusters themselves are too numerous, some of the smallest are taken away to give the others more room, and to throw into them more of the vital energy of the plant. By this means large bunches of well-filled berries are obtained, and the weight of fruit from the whole vinery or vineyard is much increased, while the quality of the juice is also improved. The implement used by those who cultivate the vine on a small scale in hothouses, for thinning the berries in the clusters, is a small and sharp-pointed scissors.

The thinning of the clusters themselves, when they are set too closely on the fruitful branches, not only favours the maturity of those that are left, but strengthens the branches for forming new flower-buds and bearing fruit on the twigs put forth in the succeeding season. In the large vineyards of the East the cultivator could not attend so closely to the thinning of each individual cluster as is done by the hothouse cultivator of Britain ; but, doubtless, it was the general practice to reduce the number of the clusters, for the sake of strengthening those that were left ; and the large clusters of Eschol may have been beholden to this practice, as well as to superiority of climate, for their remarkable size. To the thinning of the clusters, and not, as stated by many commentators, to the pruning of the branches, the beautiful simile used by Him who called himself the “ True Vine ” was applicable—“ Every branch in me that beareth fruit, the Father—the Husbandman—purgeth it, that

it may bring forth more fruit." And a sharp instrument, even the word, is used in this spiritual process:—"Now ye are clean, through the word which I have spoken unto you."

The compound word, translated in the English version of Solomon's Song by the words "tender grape," is rendered by Symmachus "the vine blossom." In the Septuagint the words used denote the bud, or budding, of a flower. The flowering of the vine would correspond, in regard to season in Judea, with the putting forth of the early figs. The vine "yieldeth a good scent" in the open air, when in blossom, but it becomes a heavy smell in the confined air of a glass vinery. In the same way, a sprig of flowering hawthorn—"the milk-white thorn that scents the evening gale"—yields a heavy and disagreeable smell in a close room.

All the species of the vine are ligneous climbing shrubs, so weak as not to support their own weight. Growing in a wild state in natural



"I am the true vine, and my Father is the husbandman. Every branch in me that beareth not fruit he taketh away." John xv. 1.

(VITIS VINIFERA—THE VINE, FLOWERING.)

forests, the vine ascends amongst the branches of the trees till it reaches their summits, and there, under the influence of light and free air, it bears fruit. When the trees fall, the vines fall with them; and so it was with ancient Jerusalem, when she leant on other support than that which it was the gracious purpose of Jehovah, the dresser of His own vineyard, to afford. "Thy mother," says Ezekiel, "is like a vine in thy blood, planted by the waters: she was fruitful and full of branches, by reason of many waters. And she had strong rods for the sceptres of them that bare rule, and her stature was exalted among the thick branches, and she appeared in her height with the multitude of her branches. But she was plucked up in fury, she was cast down to the ground, and the east wind dried up her fruit; her strong rods were broken and withered, the fire consumed them. And now she is planted in the wilderness, in a dry and thirsty ground." Cultivated vines are trained on poles, trellises, or

archways of wicker-work, and sometimes, like the ivy and honeysuckle, are planted beside living trees, that from them they may receive support. The fig-tree in Palestine is occasionally seen bearing up the weak branches of a vine planted near it. To sit, "every man under his own vine and under his own fig-tree," is an emblem of national peace and prosperity, yet to be fully verified in the Holy Land, when Israel shall acknowledge the prophet of Nazareth as their Messiah and King. The wood of the vine is of little or no use except for burning. "Shall wood be taken thereof to do any work? or will men take a pin of it to hang any vessel thereon?" "Thus saith the Lord God, As the vine-tree amongst the trees of the forest, which I have given to the fire for fuel, so will I give the inhabitants of Jerusalem." And so it is with a withered branch, outwardly joined to the true Vine, but lacking vital union, and receiving no sap from the roots and stem.

Scripture emblems, having been used by or under the direction of the Author of Nature and of Science, are uniformly expressed in terms that are minutely correct. Ordinary writers and composers of poetry do not bind themselves to truthfulness in every part of their similitudes ; but, as was remarked in the outset, no such liberty was taken by the poets and prophets of inspiration. When a certain event, happening in judgment for transgression, was compared by one of the sacred writers to the falling of a vine leaf, reference was made to the interesting fact that a vine leaf has a peculiar mode of falling. Attached by cellular tissue to the stem, it separates easily therefrom when the time of falling comes ; and its long, thick, and heavy foot-stalk prevents it from twirling in the breeze like other and lighter leaves ; and, falling in a vertical line, it alights on the ground with a hollow clash, having a startling effect in a calm and quiet day, and differing widely from the rustling sound so

common in woodlands at the season styled “the fall of the leaf.” Perhaps there were few if any of the sermons preached by Him who was compared to the Rose of Sharon and to the citron tree among the trees of the wood, which did not contain interesting and instructive allusions to the natural economy of plants, all equally truthful, and applicable, with that by which the union existing between Himself and His saints, is held forth under the similitude of the union between the living vine and its living branches,—a union without a continuance of which there can neither be life in these branches, nor that outward fruitfulness which results from a constant supply of vital energy.

CHAPTER IV.

THE PROPERTIES AND USES OF PLANTS.

IN that sublime hymn on the works of creation and of providence, the hundred and fourth Psalm, it is declared that the Almighty "causeth the grass to grow for the cattle, and herb for the service of man; that he may bring forth food out of the earth; and wine that maketh glad the heart of man, and oil to make his face to shine, and bread which strengtheneth man's heart." And in the record of creation it is stated by Moses that God said to our first parents, "Behold I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat. And to every

beast of the earth, and to every fowl of the air, and to every thing that creepeth upon the earth, wherein there is life, I have given every green herb for meat." The restriction made regarding the fruit of the tree which was in the midst of the garden, implied moral subjection and probation; and it is not necessary to believe that the fruit of that tree possessed qualities immediately injurious to animal life; and the intoxicating effects poetically ascribed to it by Milton are not altogether confirmed by the expression—"In the day ye eat thereof, then your eyes shall be opened, and ye shall be as gods, knowing good and evil." Regarding the species and name of the tree itself, as well as in respect of the situation occupied by Eden, many legends, more or less of a fabulous character, have been current amongst different nations. The inhabitants of Ceylon believe that Eden lay in their flowery island, the "gem of the eastern main;" and they point out a native species of tree as the tree of

the forbidden fruit. This tree, the *Divi Ladner*, or *Tabernæmontana alternifolia* of botanists, is described as bearing very beautiful and tempting fruit, and having finely scented flowers. The shape of the fruit, it is further stated, gives the idea of a piece having been bitten off. The Ceylonese declare that though now poisonous, this fruit was excellent before Eve ate of it. It is recorded that, shortly after the taking of Colombo in 1795, two English soldiers, who were tempted by its beautiful appearance to taste it, soon after sickened and died.

The qualities of plants have been conferred upon them by their Creator. In a large measure they exist independently of the kind of soil in which the plants may strike their roots; and wholesome and poisonous plants may be found growing side by side, their roots intermingling, and their leaves acted upon by the same light and air. It is true that the mineral substances contained in the soil may, being taken up by the

roots in a soluble state, to some extent affect the constitution and qualities of the plant; but each plant, nevertheless, retains its own nature. It has been thought that the bitterness of the fruit growing on the "vine of Sodom," arises from its being impregnated with the nitre and sulphur of the soil and atmosphere of the regions near the Dead Sea; but if it be true that this wild vine is the same plant as the "wild gourd" of the sons of the prophets, it is a poisonous plant in any situation. Of those who "sacrificed unto devils and not to God," it is said, "Their vine is of the vine of Sodom, and of the fields of Gomorrah: their grapes are grapes of gall, their clusters are bitter." The wild vine that produced the wild and poisonous gourds was a plant of the cucumber kind, having broad leaves, resembling those of the vine. The "death in the pot" that called for the working of a miracle by Elisha, was caused by the mistake of one who "went out into the field to gather herbs,

and found a wild vine, and gathered thereof wild gourds his lap full, and shred them into the pottage;" for, it is added, "they knew them not." The bitter cucumber, *Cucumis colocynthis*, has fruit the size and colour of an orange; and the pulp, which is light, spongy, and white, is most disagreeably and even intolerably bitter. The dried fruit is imported under the name of coloquintida, a very powerful medicine, requiring, on account of its violent effects, to be employed with caution. It is probable that the bitter flavour imparted to the pottage at Gilgal at once led to the discovery of the mistake, and before any injurious effects could have resulted therefrom.

The most poisonous of plants may at times be of medicinal use. Even the deadly nightshade is a valuable plant in the hands of a skilful medical practitioner. The existence of these plants is therefore a proof of Divine goodness; and

doubtless their natural qualities are more intense now than they were in Eden, though it is not necessary to believe that, at the entrance of sin, poisonous qualities were imparted to certain plants in which, previously, qualities having this tendency when developed, did not exist. The grass being made to grow for the cattle, certain plants were mingled with it, fitted, from their stimulating effect, to render it wholesome as food. The peculiar qualities of some of these plants, such as *Ranunculus arvensis*, the annual crowfoot, may be more intense now than they were at one period; but while the species of crowfoot just named, which, it should be stated, occurs but rarely, is dangerous to cattle, other species of the same genus, though possessing acrid qualities, are apparently eaten by cattle with advantage. These grow in every pasture; for cattle do not, like their possessors, enjoy the privilege of bringing carminative and stimulating articles of

food from other climes. In general, cattle refuse to eat those plants that are fitted to injure their health.*

By cultivation, some plants are divested of their poisonous qualities, and become wholesome. The common garden celery is an instance of this; and another plant belonging to the same natural order, the Burnet-saxifrage, is a dangerous species when growing in a wild state, though under cultivation its roots become valuable and wholesome. The order to which the common cultivated potato belongs is represented by the baneful nightshade;

* This has been otherwise explained by some as resulting from a change in the constitution of the bodily frame. The question is one of those that cannot meet with a decisive answer on either side. It is true, however, that certain plants are poisonous to man, while harmless when used as food by some inferior animals, and that certain browsing animals eat plants which others reject. But this predisposition in some animal bodies to receive injury from the juices of certain plants, may exist conjointly with poisonous qualities in these plants which they did not originally possess, or which are only developed under particular circumstances.

and the poisonous qualities natural to this order may be traced in the fruit of the potato. Cultivation seems to develope the good qualities of some plants, while those of an injurious nature, and which may have gained the ascendancy at that fatal period when the earth was cursed for man's sake, are more or less overpowered. When the lion shall again eat straw like the bullock, there shall be nothing to hurt or destroy in all the holy mountain. The blighting and destructive effects of sin will no longer be typified by the ravening of beasts of prey, nor the fatal effects of vegetable poisons. And in the heavenly paradise, where there shall be no more curse, the leaves of the tree bearing twelve manner of fruits shall be for the healing of the nations.

While some plants are poisonous, others, often growing beside them, furnish antidotes to their poisons. And so, while there is sin and spiritual disease in the world, there is also balm in Gilcad adapted to the cure of every disease



" Instead of the thorn shall come up the cypress tree, and instead of the brier shall come up the myrtle tree : and it shall be to Jehovah for a name, for an everlasting sign that shall not be cut off." Isaiah lv. 13.

(CUPRESSUS SEMPERVIRENS—THE EVERGREEN CYPRESS.)
(MYRTUS COMMUNIS—THE MYRTLE.)

and every evil. “Is there no balm in Gilead; is there no physician there? why then is not the health of the daughter of my people recovered?”

Plants, as created, are possessed of botanical affinities, by means of which they are arranged by botanists into classes, divisions, alliances, orders, and genera. There are orders which, like that comprising the lilies, excel in beauty; and others which, like that containing the grasses and grain-bearing plants, excel in use. Some orders are possessed of poisonous qualities, and some are eminently medicinal. From poisonous orders, some valuable fruit-producing plants are selected; and from those which are peculiarly important in an economical sense, there may be selected a few species having injurious qualities.

The olive, so important a plant as furnishing the oil for the lamps in the tabernacle and temple, and so interesting from the various references made to it in Scripture, gives its name to the natural order *Oleaceæ*, an order containing the

ash-tree, so useful for its timber, and the privet, lilac, phillyrea, and other trees and shrubs. The seed of the olive contains a peculiarly large proportion of fixed oil. The two Witnesses of the Revelation are typified by the two olive trees of Zechariah, which appeared “upon the right side of the candlestick, and upon the left side thereof.” The olive branch is an emblem of peace; and its leaf once gladdened the patriarch Noah, when the dove returned to the ark, “and lo, in her mouth was an olive leaf plucked off.” The holy anointing oil of the tabernacle, like which no composition was to be made for common use, was rendered fragrant by a mixture of sweet spices—of pure myrrh, sweet cinnamon, sweet calamus, and cassia. Those graces and Divine operations on the soul of which this fragrant oil was emblematical, are not imparted for profane use; and those to whom they are imparted, are required to keep themselves unspotted from the world. These graces were imparted to the human

nature of the God-man, and are not withheld from those who become one with him through faith. “All thy garments smell of myrrh, and aloes, and cassia, out of the ivory palaces, whereby they have made thee glad.” The holy obedience of the Son in human nature is declared to be the cause of this anointing. “Thou lovest righteousness and hatest wickedness: therefore God, thy God, hath anointed thee with the oil of gladness above thy fellows.” The “Beloved” is to the Church as a bundle of myrrh and cluster of camphire; and like graces are manifested by his mystical Bride. “How fair is thy love, my sister, my spouse! how much better is thy love than wine! and the smell of thine ointments than all spices! Thy lips, O my spouse, drop as the honey-comb: honey and milk are under thy tongue; and the smell of thy garments is like the smell of Lebanon. A garden inclosed is my sister, my spouse; a spring shut up, a fountain sealed. Thy plants are an orchard of

pomegranates, with pleasant fruits; camphire with spikenard, spikenard and saffron; calamus and cinnamon, with all trees of frankincense; myrrh and aloes, with all the chief spices." Graces innumerable are imparted and possessed, and nothing is wanting that is fit for bestowal.

The calamus, or aromatic reed, belongs to an order of plants coming after the sedges, and placed near the lower end of the scale of endogenous plants. The arum is the type of the order, which includes several ornamental and curious plants, growing in marshy grounds, and among others the beautiful *Typha*, the bur-reed, *Dracontium*, and *Calla*. Several species in this order are aromatic, and the thick fleshy roots of many contain an acrid stimulating principle, which passes off when heat is applied; so that in some parts of the world, these roots are used as articles of food. This principle is retained in the dried roots of the calamus, which are used medicinally. The genus *Calamus*, to which the

calamus of the Bible does not belong, has the inflorescence of a palm with the habit of a grass, and thus forms a connecting link between the palms and grasses. *Acorus calamus* is a native of Britain, and grows very plentifully in some English marshes, as well as on the banks of oriental rivers. It was said by Linnæus to be the only native aromatic plant of northern regions. The aromatic principle is an essential oil, obtainable by distillation. English druggists import the dried roots of this plant from the Levant, although unlimited quantities, equally good, could be procured in Lincolnshire and Norfolk. It was used in medicine in the time of Hippocrates.

The cassia, another element in the holy oil, is the dried bark of *Laurus cassia*, as cinnamon is that of *Laurus cinnamomum*. The first is a lofty ever-green tree, a native of Ceylon; and the other, an ever-green tree of low stature, growing in the East Indies. While cinnamon bark is

always dry, that of the cassia becomes mucilaginous in chewing. The natural order *Lauraceæ*, of which *Laurus* is the principle genus, consists mostly of ever-green trees and shrubs, possessing in some of their parts more or less of a spicy quality. The common sweet Bay, a native of Italy, but introduced nearly three hundred years ago into British gardens, is a familiar example of the order. Cassia bark is coarser, and does not roll up like cinnamon, and is also inferior in fragrance. Camphire is obtained from a distillation of the roots of *Laurus camphora*. The leaves of *Laurus nobilis*, the sweet Bay, are an emblem of victory; and, notwithstanding this, are also used in cookery and medicine. The Sassafras tree belongs to the same genus. The roots and leaves of the cinnamon tree yield an oil; that obtained from the leaves being called oil of cloves, and that yielded by the roots oil of camphor. Cinnamon bark is astringent, cordial, and tonic. The cassia buds of commerce are the

dried fleshy receptacles of the seed of the cinnamon laurel, and not of the cassia. The beauty and uses of the genus *Laurus* raise it to a high rank.

Myrrh, a gummy extract from a tree of the acacia family, has an extremely bitter taste, but an agreeable smell, and is of conservative qualities; hence it was used in the process of embalming. There was thus, in the composition of the holy oil, typified by Myrrh, the purification and preservation of saints; and by the calamus, cinnamon, and cassia, the various healing gifts and pleasant graces bestowed upon them. Christ is a "bundle of myrrh" to his saints in the preciousness of his righteousness, and the richness of his quickening graces. He is also a "cluster of camphire" in his healing influences; and such influences belong to all the trees and plants to which the Hebrew word translated camphire is referred,—the camphor laurel above mentioned, the cypress, and various others. The

cypress yields a rich gum, and its chips were used to flavour rich wines. The ancient use of the branches of this tree in funeral ceremonies arose not from any native gloominess belonging to the habit of the tree, but because, from its being ever green, and from the great durability of its timber, it was esteemed an emblem of immortality. The Hebrew word has also been supposed to signify balm, dates, the Cyprus Vine, and the *Cyperus* or sedge, some sedges having fragrant properties.

The natural order *Umbellaceæ*, comprising those plants that carry their flowers in umbels or rayed tufts, is one of the most important to the world, though, as regards beauty, one of the least attractive. It contains the Scripture-mentioned plants, coriander, cumin, anise, and hemlock ; and amongst its well-known cultivated plants are the caraway, parsley, carrot, and parsnip. Some umbellaceous plants are dangerously poisonous, while others supply food by

their roots when cultivated, and carminatives to food by their leaves and seed. Some, as has already been stated, are poisonous when wild, and harmless when cultivated. The fresh roots and leaves of some are narcotic, and the seeds of many species are aromatic and stimulating. The cumin (*Cuminum Cyminum*) is a dwarf annual herb somewhat resembling fennel, and cultivated for the sake of its hot and aromatic seeds in the south of Europe and in Asia Minor. By the law of Moses tithes were paid from corn; but it is believed that the Scribes and Pharisees themselves conferred a like distinction on the less important plants, "mint, and anise, and cumin." The anise (*Pimpinella Anisum*) is an annual, and the dill (*Anethum Graveolens*) a biennial herb, named from a Greek word signifying "to burn," from its heating qualities. The fennel belongs to the same genus with the dill, and has been supposed by some to be the plant that is meant by anise in the New Testament. They are all

three used in medicine as carminatives, and both the plants and seeds are eaten. The fennel is perennial, and a larger herb than the dill. Neither of them will ripen so freely in this country as to be of commercial value, but large quantities of the seeds are imported yearly from the south of France and elsewhere, and used in medicine, and also in the manufacture of British gin, though not avowedly. But neither is it avowed that another Scripture plant, the Calamus, is used by English maltsters as a substitute for hops. It is well when plants used in this way are not only harmless, but wholesome, since in the art of adulteration injurious ingredients are too often used. The coriander (*Coriandrum sativum*) is an annual cultivated herb, with strongly scented leaves, and slightly aromatic seeds, which are used in spices, and for counteracting the taste of senna when used as a medicine. The seeds are also used by confectioners. This plant is hardier than the dill and fennel,

being easily cultivated in England, where, indeed, it has escaped from cultivation and become naturalised. The miraculous manna of the desert appeared to the wondering Israelites like coriander seed. By some the hemlock of Scripture is supposed to be *Ænanthe crocata*, a species of water-dropwort, and a strong poison; but this plant grows in ditches and watery places, whereas it is said by Hosea that hemlock grows in the field—"Judgment springeth up, as hemlock in the furrows of the field." The true hemlock (*Conium Maculatum*) is medicinal as well as poisonous, and is yet sufficiently obnoxious to justify its being classed with gall by Amos. "Ye have turned judgment into gall, and the fruit of righteousness into hemlock." This is a common British weed, easily known from other umbellaceous plants of a like habit by its glossy and spotted stems.

The *Labiaceous* order of plants, whose distinguishing mark is their irregular corolla with

its lips and mouth, is amongst the most ordoriferous of floral groupes. It includes the well-known garden thyme, the balm, the different kinds of mint, the lavender and garden hysop, the rosemary, sage, marjoram, horehound, ground-ivy, cat-mint, savory, germander, and Jerusalem sage. Many of them abound in essential oil, and this oil contains camphor, which is specially abundant in sage and lavender. Some are eminently wholesome, and all possess tonic, cordial, and stomachic virtues. The balm of Scripture is, like myrrh, not an herb, but the gum of a tree; but this fragrant order is represented by mint, one of the plants that were tithed by those who forgot "the weightier matters of the law." Peppermint (*Mentha piperita*) is a medicinal herb, pungent, cordial, anti-spasmodic, and carminative; and spearmint (*M. viridis*) is cultivated for the production of an essential oil, a conserve, mint-water, and a spirituous liquor; and is also used for culinary purposes. Most of

the plants of this order thrive in a dry warm soil, and should be cut for use in very dry weather, when the proportion of their virtues to the bulk of the plant is at its greatest. The Chinese import sage to use as a substitute for their own tea, and to counteract its enervating effects. The common wild thyme of dry and sunny British pastures may be applied to a similar use, and marjoram, rosemary, and many others of this fragrant family are also lavish of their offered but unprized benefits. Bees are much attached to the fragrant flowers of this interesting family of plants.

The *Terebinthaceous* order, now divided into several groupés, consists of shrubs and trees with small flowers, and alternate leaves arranged on leaf-stalks. Some are valued for the beauty of their foliage and habit of growth, some for their timber, some for their medicinal properties, and others for their fruit. The name of this group is derived from the balsamiferous resin which

abounds in the leaves and bark of all the species. It is this that imparts fragrance to the foliage of the common walnut, and gives to the walnut grove on a calm summer evening a character that calls to mind many Scriptural allusions to balm, frankincense, rich odours, and the various spiritual graces which they typify. Of fruits this order produces, besides the well-known walnut, the pistachio and cashew nuts. Gum, balsam, resin, balm, mastich, and venetian turpentine are the products used in the arts; and the trees of this order afford the finest kinds of incense. The true frankincense used in Hindoo temples is produced by *Boswellia thurifera*, and the balsam of Mecca by *Amyris gileadensis*. These were articles of commerce at an early period; the balm of Gilead with other spiceries having been conveyed on camels from Gilead to Egypt in the time of Jacob. The common walnut is a native of Persia, but was introduced into Britain nearly three hundred years ago. The sumach of shrubberies

is a terebinthaceous shrub, but its qualities are less wholesome than those of the leading species of trees and shrubs in the order.

The trees and shrubs of the order *Aurantiaceæ* have fragrant flowers and fleshy fruit; and both leaves and fruit contain a volatile oil which possesses tonic and stimulating properties of a powerful nature. The Lemon (*Citrus Limonum*), the Citron (*C. Medica*), and the Orange (*C. Aurantium*), are well-known fruits, and are supposed to have been the golden apples of the fabulous gardens of Hesperides. The citron was introduced from Asia into Europe, and first cultivated in Italy in the second century; and the orange a thousand years later. The term *Malus Medica* applied by the Romans to the citron corresponds with the name *apple* given to this fruit in the English Bible. The various species of *Citrus* are ever-green shrubs or low trees, with fragrant flowers and beautiful leaves. Either the citron or the orange may have been alluded to by Solomon;

and the beauties of either tree may form an appropriate emblem of the graces of Immanuel. "As the citron-tree among the trees of the wood, so is my beloved among the sons. I sat down under his shadow with great delight, and his fruit was sweet to my taste." The fruit of the citron is oblong, while that of the orange is round. The medical or cooling properties of the fruit are referred to in the words, "comfort me with citrons (or oranges); for I am sick of love."

Aloes are mentioned in the same sentences with myrrh. The aloe belongs to the same order as the day-lily, and the genus comprises several species from which medicinal drugs are prepared. These are odoriferous and preservative, and were used in the process of embalming, and also for perfuming beds and clothes, as mentioned in the seventh chapter of Solomon's Proverbs, and in the forty-fifth Psalm.

Saffron is furnished by the stigmas of *Crocus* flowers, especially those of *Crocus sativus*, and is

aromatic, and possessed of a colouring matter which disappears under the influence of the sun's rays. It is conjoined with spikenard in the emblems of the Church's graces. Spikenard has a strong taste as well as a fragrant smell, and furnished an ointment which was considered of peculiar value. Saffron was manufactured in Asia long before it was known in Europe, and the best spikenard is still brought from Hindustan. The name Saffron is of Arabic origin. The names of some of the spices and ointments mentioned by Solomon afford proof of the wide extent of his commercial relations, these having been, as they still are, mainly produced in the East Indies.

The pomegranate, imitations of whose fruit were included in the decorations of the temple, belongs to the beautiful and poetical order *Myrtaceæ*, named from the celebrated myrtle. The bark, leaves, and flowers of Myrtaceous trees contain a very aromatic, volatile oil, which is

somewhat acrid, tonic, and stimulant. To this order belong the All-spice, Clove, Rose-apple, and Guava. The pomegranate (*Punica granatum*) is a deciduous shrub, and its fruit was called by the ancients *Malum Punicum*, or the Carthaginian apple. The specific name *granatum* is conferred in allusion to the numerous grains of its fruit. The beautiful myrtle, coming up in place of the brier, is an emblem of the spiritual graces and prosperity of the Church in the latter days.

The various allied orders to which belong the narcissus, amaryllis, snow-drop, convallaria, lily, tulip, and fritillaria, are more remarkable for beauty than for use; but they form a floral group so lovely as to have been the subject of admiration in all ages. The lilies of the field, to which Solomon in all his glory could not be compared, are thought by some botanists to have belonged to the amaryllis group, which comprises the narcissus, snow-drop, and snow-flake. The true lilies belong to another order, even

that which is adorned by the modest graces of the humble *Erythronium*, the rich hues of the lilies themselves, and the flaunting glories of the tulip. Whilst several botanists place the "lilies of the field" in the amaryllis family, others, on grounds perhaps equally good, consider that a real lily, even the scarlet martagon, was referred to under the New Testament name *Krinon*. In this alliance of surpassingly beautiful flowers, many of the species and varieties may be considered as possessing equal claims to the honour conferred on the "lilies of the field." The "lily of the valley" of modern gardens, the humble *Convallaria*, belongs to yet another order in the alliance of lilies. This beautiful flower aims not, like its allies, at show. While possessing an odour esteemed as the most grateful of any emitted by flowers, it hides its blossoms under its leaves in its favourite places of native growth—"the cool shady places, by the streams of living waters." That the Lotus Water-lily should

have been, as is said, the “lily of the valleys,”—the *Shushannah* of the Bible,—is improbable, since the word is applied to lilies growing in pastures,—“Thy two breasts are like two young roes that are twins, which feed among the lilies.”

The order *Palmaceæ* contains what Linnæus termed the primes of the vegetable kingdom. The stately palm, in one or other of its kinds, is one of the most useful of trees, furnishing by its fruit food, drink, and oil; by its leaves, cordage, and coverings for the roofs of houses; and by its stem, arms, utensils, and beams for houses; and, from certain kinds, wine, and flour or sago. The palm was dedicated by some ancient nations to the sun; and was used in decorating the holy place of the temple on Mount Moriah, as an emblem of the Divine light. Palm leaves are symbolical of triumph; and the redeemed in heaven, triumphant over sin and death, are represented in apocalyptic vision as standing



"How fair and how pleasant art thou, O love, for delights! This thy stature is like to a palm tree, and thy breasts to clusters," Song vii. 6. 7.

(PHENIX DACTYLIFERA—THE DATE PALM.)

before the throne, clothed in white robes, and with palms in their hands.

The timber of the palm, used as a beam, powerfully resists incumbent pressure. Being an endogenous plant, its growth of stem proceeds from the interior, instead of being caused by the deposition of outside layers of young wood. The central part of the stem consists of loose cellular tissue; whereas the outer portion is hard, and contains vascular tissue or woody fibres. As the bundles of vascular tissue are added from the interior, the older vessels are forced outwards; and hence the outer portion of the stem of a palm, unlike that of an ordinary exogenous timber tree, is both the oldest and the strongest of the timber. Hence, while ivy twining round the forest trees of Britain prevents their free growth, and causes contractions in their stems, any plant of a similar habit of growth may twist itself around a palm without at all injuring its stem, or retarding its growth. Hence, also, the

peculiar strength of the palm stem when used as a horizontal beam—soft in the interior, and strong and hard at the circumference—it is in effect, though not in reality, a hollow tube; and its principle of strength is the same as that possessed by a hollow iron column, or by the aerial iron tunnels of modern engineering. Xenophon, in noticing this resisting power of palm timber, made a remark which has led into many a classical but unscientific comment, on the assumed fact that a growing palm-tree, when subjected to pressure, will bend the contrary way; and will even grow upwards with greater vigour when forced downwards by weights.

The lentils and other kinds of pulse mentioned in Holy Writ, belong to the important and highly nutritive order of leguminous or pod-bearing plants. There is more nutrition in lentils and peas than in an equal quantity of any of the cereal grains. Their nutritive and wholesome qualities are alluded to in the history of Daniel

and his youthful companions. The corn-grasses furnish food that is somewhat less nutritive than pulse ; but the wide extent of their culture renders them the most important of bread-producing plants.

The wormwood, belonging to the composite order of plants, is a useful medicinal herb, but with an unpleasant smell ; and yet, it is nearly related to the fragrant southernwood of the cottage gardens of Britain. Various kinds of fruit mentioned in Scripture, such as the vine, the fig, the citron, the melon, the gourd, and the mulberry, are possessed of qualities that are well known and appreciated. The lump of figs applied to Hezekiah's boil was fitted to exert a healing influence, though the cure was none the less miraculous.

The *Rosaceous* order, including, along with the "queen of flowers" itself, the apple, pear, cherry, almond, hawthorn, and many other trees and shrubs, yields various preparations ; and,

among others, rose-water, gum, and prussic acid, that violent poison being procured from the seeds or kernels of many of the genera, and also from their leaves. But the rose has properties of its own, distinct from those of its botanical kindred; and this most beautiful of flowers, still called in Persia the “Flower of David,” in honour of the Royal bard of Israel, well befits the rank to which it has been raised in the Bible, being made an emblem of the graces of its Creator, and of those that are in the latter days, and under the blessed reign of Immanuel, to be conferred on Zion’s children. It has indeed been supposed that the rose of Solomon’s Song, and of Isaiah’s prophecies, was not a rose, but a liliaceous plant; even the *Polyanthus-Narcissus*, a favourite of the florist. The *Narcissus* excels in elegance, but its claims to be recognised as the Rose of Sharon are not fully established. The species of rose styled the Rose of Sharon in British gardens, has a single flower, and is therefore less showy than

most of its garden companions. It seems to owe its name to its harmless character, being a rose without a thorn, and one of the few species of roses whose stems are smooth and unarmed.

The trees of the pine and fir tribe, ranking in the same order with the cypress, the wood of which is supposed to have furnished the materials of the ark constructed by Noah, are all possessed of a resinous juice, which imparts lasting qualities to their timber. The pines are generally sombre and majestic in their appearance, and sublime rather than beautiful; and in the various zones of climate into which the world is divided, representatives of the family, possessing more or less of these distinguishing features, are found growing in a native state. Thus, while in Britain and the north of Europe *Pinus sylvestris* appears in gloomy grandeur, rearing its “murky head” over the fair horizon, and calling to mind by its presence ideas of strength and stability, the stately cedar, in eastern climes, betokens still

more forcibly the greatness of its Creator. The Cedar of Lebanon, whose top is “hid” amongst its thick and rigid boughs, and the Indian Cedar of the northern ravines of the Himmalaya Mountains, though different in habit when young, resemble each other in appearance when old, the Indian Cedar losing in age the gracefully pendulous form assumed by the points of its branches in youth. They are equally deserving of the encomiums passed by the sacred writers on the majestic appearance of the cedar, though it is doubtless to the Cedar of Lebanon that the inspired records allude. There is, however, a striking coincidence between the Indian name of the Himmalayan Cedar and the term applied to the cedar-tree by the Psalmist in the eightieth Psalm. The “goodly cedars” of the English Bible are, literally, “cedars of God;” and the Hindu name of the Himmalayan Cedar (*Cedrus Deodara*) is “Devadara,” a term implying that it is in a peculiar manner worthy of being called

after the name of the Almighty—the “ tree of God ”—a “ gift ” from God to man. The similarity of the two appellations may not amount to a proof that the Psalmist was describing the Deodara instead of the Cedar of Lebanon, in using the words, “ the boughs thereof were like the cedars of God ; ” but the use of such an expression by an inspired writer, countenances the use of similar expressions in describing plants or other natural objects which have something in their appearance peculiarly suggestive of the Divine power and presence. It is expected that the Deodara, which in the climate of Britain exceeds the Cedar of Lebanon in rapidity of growth, will soon enter largely into British woodlands. To a partial extent, trees and other plants may be cultivated successfully in climes differing considerably from those of their native localities ; and thus, within certain limits, the labours of the cultivator are rewarded. There

is, however, an adaptation in the nature of plants to the amount of heat, light, and moisture afforded in the countries to which they are indigenous ; and hence, in describing the vigorous growth of the Cedars of Lebanon, the Psalmist calls them not only the trees of Jehovah, but the trees which He hath planted. The Cedar of Lebanon in Britain, planted by the hands of man, far from its native home, shows signs of maturity while comparatively of diminutive stature ; and the common larch, brought from a country not so far away, decays at a very early age in many parts of Britain, where either the soil or climate, or it may be both, may differ from what this tree was accustomed to on its native Alps. There is deep significancy in the emblem of a garden planted by the Lord, as illustrating the advantages of the Christian Church. There it is that saints appear like green olive-trees and ever-flourishing palms. There it is that the Beloved goeth down



" Behold the Assyrian,—a cedar in Lebanon, with fair branches, and with a shadowing shroud, and of an high stature ; and his top was among the thick boughs." Ezek. xxi. 3.

(CEDRUS LIBANI—THE CEDAR OF LEBANON.)

to the beds of spices, to feed in the gardens, and to gather lilies.

The study of plants belongs to the most interesting department of the natural sciences; and the foregoing remarks, brief and imperfect though they be, may serve to illustrate and enforce the truth, long neglected and still not rightly prized, that a rich mine of knowledge, and, it may be, of Christian edification, awaits those who may set themselves to study Scriptural allusions to the vegetable kingdom, in the light derived from experience of the habits of plants, and from the researches of botanists. The instruction to be derived from this delightful study can never be despised by any who seek an increase of knowledge and of love at the Fountain from whence both proceed; asking enlightenment and grace from Him who, before time, said to those who came to Him enquiring after truth,—

“ Consider the lilies of the field, how they grow.”
To the manifestation of His power, goodness,
and glory, all these things tend ; and to the same
object all efforts made to explain them ought to
be devoted.

THE END.

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